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BIHANG

TILL

KONGL. SVENSKA VETENSKAPS-AKADEMIENS

HANDLINGAR.

TJUGUSJUNDE BANDET.

AFDELNING IV.

ZOOLOGI, OMFATTANDE BÅDE LEFVANDE OCH FOSSILA FORMER.

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STOCKHOLM 1901—1902. P. A. NORSTEDT & SÖNER.

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INNEHÅLL AF TJUGUSJUNDE BANDET.

Afdelning IV.

(Zoologi, omfattande både lefvande och fossila former).

Sid.

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BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 1.

ON

THE SPIDERS COLLECTED IN FLORIDA

BY DR. EINAR LÖNNBERG 1892—93

BY

ALBERT TULLGREN

WITH ONE PLATE

COMMUNICATED JANUARY 9, 1901

REVISED BY G. LINDSTRÖM AND CHR. AURIVILLIUS

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STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1901

In the years 1892—93 Dr. EINAR LÖNNBERG visited Florida for the purpose of making zoological collections. From this sojourn he also brought home a collection of spiders, which has been kindly left to the disposition of the present author and which is described in the following pages.

The knowledge about the Floridan spiders seems to be still rather unsatisfactory. Only quite small collections have come into the hands of specialists. Scattered notes about these have been communicated by BANKS, MC COOK, PECKHAM a. o. All these notes have, however, been casual and therefore been inserted in papers treating of other things besides. The following account may therefore be the only one, which a little more explicitly bears upon this subject. It may consequently be of interest, the more so as the material is comparatively rich, comprising not less than 57 species, 11 of which are as far as I can find new to the science.

Most of this material is collected in the central part of South Florida in Orange county, but there are also specimens from the west coast. Hillsboro county and from Key West.

Concerning the localities in which the spiders were collected Dr. LÖNNBERG informs me that some spiders had their favourite haunts at the shore of the lakes. where they could be caught under boards, logs and similar objects. Others were found in the dry pineland, where one species (Lycosa sp.) used to make smooth vertical holes in the sand. 25 cm. or more deep and 1 cm. wide. The big, hairy spiders (Lycosa carolinensis?), grayish above and black beneath, and the jet black ones (Lathrodectes mactans) with small red markings were usually collected under pieces of bark, stumps and such things lying on the ground. The latters are very poisonous, so that they can cause illness for a long time, if they bite somebody. The former often visit the houses and are welcome, because they destroy cockroaches. They have a formidable appetite. A specimen kept in confinement in a glassjar together with a brown lizard (Oligosoma) killed and devoured the latter completely not even leaving skin or skeleton. Other spiders were caught among plants and of these many had green and yellow colours predominant. The »crabspiders» (Gasteracantha) had usually their comparatively large nets among the vegetation, often in the orange trees. Large spotted spiders (Nephila) with their long legs ringed with black and yellow used to have their large webs consisting of very strong yellow threads stretched between pines or palmettoes often 5—6 feet or more above the ground. Some jumping spiders (Phidippus) used to sit on grass straws with their beautifully shining, greenish jaws visible in such a manner that they could be supposed to attract the prey.

Many small spiders were collected in the nests of wasps (»dirtflies»). These wasps have namely the habit of storing up great numbers of small spiders as food for their larvæ.

Antiodontes Thorell 1895.

Fam. **Filistatidæ.**

Filistata Latr. 1800.

1. **F. capitata** Hentz 1842.

Of this interesting species several examples are captured by Dr Lönnberg, one of them is a fullgrown male, the others females, the male being about 8 mm., a great female 15 mm.

The specimens are collected at Orlando and other places in Orange county.

Fam. **Theridiidæ.**

Theridium WALCK. 1805.

(Fig. 1 a—c).

2. **T. tepidariorum** C. KOCH 1841. Var.

Female. — *Cephalothorax* rounded on the sides, the pars cephalica very narrow. The colour pale testaceous, with a narrow black middle-line and a broad black margin. The middle-line narrow on the pars thoracica, then broader on pars cephalica. — *Eyes* placed on black spots, a little prominent and not much differing in size. The anterior central eyes are, however, larger. The two lateral eyes are nearly contiguous, placed upon a low tubercle. Seen from before, the front-row is a little recurved; the hind-row, seen from above, is nearly straight. The four central eyes form a trapezium, a little broader behind than in front. The interval between the posterior central eyes and the lateral eyes in the same row not fully as great as between the two central posterior eyes. The intervals in the anterior row have the same proportions.

Sternum very large, triangular, broadly truncated in front. The colour blackish with pale spots in the middle and near the margin at the coxæ. — *Labium* much broader than long, truncated at the apex. — *Maxillæ* longer than labium, obliquely truncated on the outer side of the apex. — *Cheliceres* pale testaceous with a black line on the outer side and a black spot at the base on the inner side, nearly thrice as long as broad, and not as broad as the femur of the anterior legs. — *Legs* 1, 4, 2, 3; pale testaceous with black rings and spots. The rings are more distinct on the posterior pairs of legs. — *Abdomen* about as long as high, clothed with short and soft hairs. The ground-colour is grayish with irregular black and brown spots. On the upper part in the centre of the abdomen is a larger and behind that a little transversal black spot bordered with white lines. On the posterior part is a narrow white line from the apex to the mamillæ. On the lateral parts of the abdomen are two or three indistinct white lines bordered by black spots. On the ventral part is near the rima genitalis a small white spot. The mamillæ are light brownish. — The *vulva* forms a short and thick vertical protuberance.

Measurements:

length of cephalothorax	2,1 mm.
breadth » »	2,0 »
length » abdomen	5,5
height » »	5,0
total length	6,5

One specimen from Oakland, in Orange co., nov. 1892.

Lathrodectus Walck. 1850.

(Fig. 2).

3. **L. mactans** (Fabr.) 1775.

Of this species the collection contains a great number of females. They vary a little in colour. All of them have the ground-colour black, but the markings are more or less effaced. Some of the largest specimens have on the dorsal part of abdomen a white ring and before this two white lines nearly forming a figure of this appearance][. Some young specimens have three ordinary spots. — I have drawn the vulva up, because it differs a little from the figure published by count Keyserling.

The specimens are collected in Orange co.: Clarcona and Orlando.

Fam. **Argiopidæ.**

Subfam. *Linyphiinæ.*

Linyphia Latr. 1804.

(Fig. 3).

4. **L. communis** Hentz 1850.

The collection of Dr. Lönnberg contains a single specimen, a female. It was captured in Orange co. — My figure of the vulva resembles more that published by count Keyserling than that represented in the paper of Mr. Emerton.

Subfam. *Tetragnathinæ.*

Tetragnatha LATR. 1804.

5. **T. elongata** WALCK. 1805.

Syn. T. grallator EMERTON. 1884.

Of this species I have only examined an ad. female. It measured 11 mm. in length. The mandibles were 3,5 mm. and the first pair of legs 41,5 mm.

Argyroepeira EMERTON. 1884.

6. **A. venusta** (WALCK.) MC COOK 1893.

Syn. Argyroepeira hortorum auct.

Several specimens from Oakland and Orlando in Orange co.

Subfam. *Nephilinæ.*

Nephila LEACH 1815.

7. **N. Wilderi** MC COOK 1889.

Several specimens from the neigbourhood of Oakland in Orango co.

One of them — an adult female — measured:

length of cephalothorax	9,0	mm.
breadth » »	6,8	»
length » abdomen	19,0	»
breadth » »	8,7	»
total length	26,5	»
length of the first pair of legs	49,0	»

It was darker coloured than the others. The back was dark brown with silvery spots.

Subfam. *Argiopinæ.*

Argiope SAV. and AUD. 1825—27.

8. **A. cophinaria** (WALCK.) MC COOK 1893.

Of this species the collection contains an ad. female captured at Ozona in Hillsboro county ($^{2}/_{11}$ 1892).

Measurements:

length of the cephalothorax	8,5	mm.
breadth » » »	6,5	»
length » » abdomen	21,0	»
breadth » » »	12,0	»
total length about	30,0	»

Three females in addition to this one from Oviedo in Orange co. (nov. 1892.) One of them measured 19 mm. in length. — The largest specimen had the normal markings. The spots on the back were silvery white; the venter had four pair of spots on the median dark band. The specimens from Oviedo were evidently young females, had lighter legs, the spots on the back were yellow, but had the same arrangement of the colours as that of the specimen from Ozona. The light spots on the venter 2, 2, (2), 2, 1. Otherwise resembled it more the figure published by Mr. EMERTON than that in Mr. Mc COOK's paper.

9. **A. argyraspis** (WALCK.) Mc COOK 1893.

Three females from Oviedo in Orange co. One of them measured:

length of the cephalothorax	5,5	mm.
breadth » » »	5,5	»
length » » abdomen	18,0	»
breadth » » »	10,0	
total length	23,5	»

10. **A. argentata** (FABR.) Mc COOK 1893. Juv.?

Several young males and females possibly belonging to this species. The total length about 6 mm. The cephalothorax thinly clothed with silvery hairs, the middle part pale testaceous. The ground-colour of the abdomen (conf. the fig. 6) white with two longitudinal bands — yellow coloured with black margin and spots — confluent at the hind-apex. The white band between this two bands marked with a black cross. The sides of abdomen with obliquely darker stripes. The venter with two lateral white lines and some light spots on the black middle-band. The legs with black rings.

Gea C. Koch. 1843.

(Fig. 5 a—b).

11. **G. heptagon** (Hentz) Marx 1890.

The collection contains several adult females and one single adult male from Orange co. of this species. As the male has not been described before, I give here a description.

Male. — *Cephalothorax* about as broad as long, rounded at the sides, very tapering towards the pars cephalica, which is a little elevated and projected, a little more than a third of the breadth of the pars thoracica. This is flattened with a longitudinal depression in the middle. The colour is yellow-brown with darker patches on the sides and towards the vertex. — *Eyes* placed on black tubercles. The central eyes larger than the lateral ones. The posterior row strongly, the anterior a little procurved. The space between the posterior central eyes not as broad as between the same and the posterior lateral and the anterior central eyes. The two lateral eyes nearly contiguous. The four central eyes form a trapezium much broader behind than in front. The space between the two anterior central eyes a little broader than between the two lateral eyes in the same row. — *Sternum*, *labium*, *maxillæ* and *cheliceres* resemble in a high degree those of the female. — *Legs* 1, 2, 4, 3, yellow-brown, without annuli. — *Abdomen* oval, without tubercles. The colour and marking resemble that of the female. *Bulbus* conf. the fig. 5 b.

Measurements:

length of the cephalothorax	1,7 mm.
breadth » » »	1,5 »
length » » abdomen	2,3 »
breadth » » »	1,5 »
total length	4,0 »

Cyclosa Menge 1866.

12. **C. conica** (Pallas) Menge 1866.

Two young females from Orange co.

Mangora Cambr. 1889.

13. **M. gibberosa** (Hentz) Simon 1895.

Syn. Epeira gibberosa Hentz 1847.
Abbotia » Mc Cook 1893.
Mangora » Simon 1895.

Two specimens from Orlando in Orange co.

Larinia Simon 1874.

14. **L. nigrofoliata** Keys. 1883.

One single male.

Acacesia Simon 1895.

15. **A. foliata** (Hentz) Simon 1895.

Syn. Epeira foliata Hentz 1847.

One single female from Sanford in Orange co. — The posterior row of eyes seen from above strongly *recurved* and the anterior row nearly straight. Mr. Mc Cook says the »both eyes rows procurved», but I believe, he has seen the two rows from before. — The total length: 8 mm.

Eustala Simon 1895.

16. **E. anastera** (Walck.) Simon 1895.

Syn. Epeirà anastera Walck. 1837.
eustala Walck. 1837 etc.

Several specimens from the neigbourhood of Orlando in Orange co. — The specimens vary in high degree in colour. Even the vulva varies a little.

Araneus Clerck 1757.

17. **A. stellatus** (Walck.) Simon 1895.

Syn. Plectana stellata Walck. 1805.
Epeira stellata Hentz 1850.
Marxia stellata (Walck.) Mc Cook 1893.

One single female from Orange co.

18. **A. bivariolatus** (CAMBR.) SIMON 1895.

Syn. Epeira bivariolata CAMBR. 1889.

One single adult male.

19. **A. benjaminus** (WALCK.) SIMON 1895.

Syn. Epeira benjamina WALCK. 1837.

Of this species Dr. LÖNNBERG has brought home numerous young and adult females from Oviedo, Orlando and Clarcona in Orange co. and Ozona in Hillsboro co. The specimens vary in high degree in colour. A great female has the back dark brown without light markings.

20. **A. nicaraguensis** (KEYS.) SIMON 1895.

Syn. Epeira nicaraguensis KEYS. 1884.

Of this beautiful species the collection contains three adult females from Orange co.: Apopka.

21. **A. labyrintheus** (HENTZ) SIMON 1895.

Syn. Epeira labyrinthea HENTZ 1847.

One single specimen — a female — from Orange co.

Gasteracantha SUND. 1833.

22. **G. cancriformis** (LIN.) MC COOK 1889.

Several specimens from Orange co.: Lake Victoria, Lake Leonore and Orlando.

Micrathena SUND. 1833.

23. **M. gracilis** (WALCK.) SIMON 1895.

Syn. Plectana gracilis WALCK. 1837.
Acrosoma rugosa EMERTON 1884.

Two females.

27. **M. sagittatum** (WALCK.) SIMON 1895.

Syn. Plectana sagittatum WALCK. 1837.
Acrosoma spinosa EMERTON 1884.

Two adult females from Lake Leonore in Orange co.

Fam. **Uloboridæ.**

Uloborus LATR. 1806.

25. **U. plumipes** LUCAS 1845.

One single adult female.

Fam. **Mimetidæ.**

Mimetus HENTZ 1832.

26. **M. interfector** HENTZ 1850.

Syn. M. epeiroides EMERTON 1882.

A single adult female from Orange co.

Fam. **Thomisidæ.**

Runcinia SIMON 1875.

27. **R. aleatoria** (HENTZ).

Syn. Thomisus aleatorius HENTZ 1847.
Runcinia brendelii KEYSERLING 1880.
Misumena aleatoria (HENTZ) EMERTON 1892.

Of this interesting species I have seen two adult and some young females from Orange co. The two adult females agree perfectly with the description of count KEYSERLING (conf. Die Spinnen Amerikas I, p. 127) and more particularly the figure of the vulva is similar. There is also no doubt that I have seen the same species as count KEYSERLING has described as type-specimen for his Runcinia brendelii. In his work: New England spiders of the family Thomisidæ, p. 369, Mr. EMERTON placed this species in the genus Misumena. In the same way Mr. EUG. SIMON considers the genus Runcinia KEYSERLING to be synonymical with Misumena LATR.[1] That is not my opinion. The Genus Runcinia SIM. has[2] the following characters: »frons transversim carinata» and »oculi medii antici a lateralibus quam inter se remotiores. An examination of Dr. LÖNNBERG's specimens shows evidently these markings. Between the posterior and anterior rows of eyes is a distinct carina and the space between the two middle-eyes in the front-row is a third longer than the space between a middle and a lateral eye in the same row. I think also that this species must be a Runcinia in the opinion of EUG. SIMON. That the Runcinia brendelii is synonymical with Thomisus aleatorius HENTZ is very acceptably in consequence of the colour of the young males as Mr. EMERTON has shown.

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[1] Conf. Hist. Nat. des Araignées ed. 2, T. I. fasc. 4 p. 1025.

[2] l. c. p. 1022 and 1024.

Misumena LATR. 1804.

28. **M. asperata** (HENTZ) EMERTON 1892.

Syn. M. georgiana KEYS. 1880.

Of this species several examples are captured by Dr. LÖNNBERG in Orange co.

Fam. **Clubionidæ.**

Subfam. *Sparassinæ.*

Heteropoda LATR. 1804.

29. **H. regia** (FABR.) THOR. 1899.

Several specimens from the neighbourhood of Orlando in Orange co.

Subfam. *Clubioninæ.*

Chiracanthium C. KOCH 1839.

30. **Ch. viride** EMERTON 1890.

Of this species Dr. LÖNNBERG has captured several examples at Orlando and other places in Orange co.

Aysha KEYS. et MARX 1891.

(Fig. 4).

31. **A. orlandensis** n. sp.

Female. — *Cephalothorax* brown, clothed with short grayish adpressed hairs and beset with long scattered upturned bristly hairs, the length is shorter than the patella + tibia on the fourth pair of legs, and the clypeus is a little broader than half that of the pars thoracica; it is surrounded by a narrow elevated border and the sides are a little curved. — *Eyes* of nearly the same size; the hind-row a little procurved, the front-row nearly straight, the space between the two lateral eyes in the posterior row a little broader than that between the two central eyes and than that between the central eyes in the posterior and the anterior row; the space between the two lateral eyes almost the same as between the two lateral eyes in the anterior row. The two central eyes in the anterior row a little larger than the lateral and the central eyes in the posterior row. The distance between the front-eyes and the margin of clypeus is not as long as the diameter of the eyes. The four central eyes form a trapezium about as long as broad. — *Sternum* nearly elliptical, truncated in front, light brown and hairy. — *Labium* about double as long as broad, somewhat tapering towards the impressed apex; on the two sides at the basis an impressed dark dot. — *Maxillæ* about a third longer than labium, obliquely truncated on the inner side of the apex. — *Cheliceres* dark red-brown, a little narrower than the femur of the first pair of legs, about twice as long as broad, the posterior margin of the claw-furrow with seven teeths. — *Legs* 1, 4, 2, 3, light brown; a scopula on the tarsus and metatarsus of the two first pairs and on the tarsus of the two other pairs of legs; the two first pairs of legs have on the femur 1. 1 spines above, on the tibia 2. 2. 2 below and 1. 1 on each side, on the metatarsus 2 near the apex below and 1 on each side, the femora of the two other pairs 1. 1. 1. spines above and numerous spines on the tibiæ and the metatarsi. *Abdomen* oblong, truncated in front, about twice as long as broad with grayish adpressed hairs, dark grayish brown, in the middle with a darker narrow line and with two pairs of impressed dots, on each side of the middle-line a row of darker brown spots. The rima genitalis very near the vulva. — The *vulva* on each side with an elevated red-brown and broad lamina, the middle part a little depressed with a pit in the middle. Conf. the fig. 4.

Measurements:

length of the cephalothorax	3,2	mm.
breadth » »	2,8	»
length » » abdomen	5,8	»
breadth » » »	2,8	»
total length	9,0	»

One specimen from Orlando in Or. co.

Fam. **Dictynidæ.**

32. **D. arundinaceoides** Keys. 1883.

A single female, probably belonging to this species.

Fam. **Agalenidæ.**

Agalena Walck. 1805.

33. **A. nævia** Walck. 1841.

A single female from Ozona in Hillsboro co.

Fam. **Pisauridæ.**

Dolomedes Latr. 1804.

34. **D. sexpunctatus** Hentz 1845.

Some subad. females.

Fam. **Lycosidæ.**

35. **L. carolinensis** Hentz 1842.

Several adult males and females from Orange county and Key West (under stones).

Measurements:

		(from Or. co.)	(from Key West.)
female:	length of cephalothorax	15 mm.	16 mm.
	breadth » »	11,3 »	11,5 »
	total length	27 »	33 »
	length of the 1st leg	43,5 »	44,5 »
	» » » 4th »	50 »	48 »

male: length of cephalothorax	13	mm.
breadth » »	9,8	
total length	22,5	»
length of 1st leg	44,5	»
4th »	48	»

The specimens vary from dark to lighter forms. Several cocoons of this species have been collected. One of them measured 20 mm. in diameter. It contained nearly 300 eggs about 2 mm. in diameter.

36. **L. arenicola** Scudder 1877.

(Fig. 9).

Syn. L. nidifex Marx 1881.

A subad. and an ad. female from Lake Leonore in Orange co.

37. **L. nidicola** Emerton 1885.

A male and a female from Orange co. — Male. — The middle stripe of abdomen dark red-brown with nearly black eyes. On each side of this there are yellowish brown stripes which are not united on the hinder part of abdomen. Posteriorly and at the sides of the middle-stripe are dark and light oblique lines and spots. The under part of abd. with irregular dark brown spots on light ground. The legs with indistinct darker rings on femora. — The palpal organ agree with the figure of Mr. Emerton.

Measurements:

length of cephalothorax	7,5	mm.
breadth » »	6	»
total length	12,5	»
length of 1st leg	26	
4th	30,2	

To this species I am inclined to count two ♂♂ from Oakland. They differ only in having the lower side of the abdomen perfectly black.

38. **L. angusta** n. sp.

(Fig. 7 a—b).

Female. — Cephalothorax dark brown, clothed with short gray hairs and some few long upturned bristly dark hairs. The lenght a little shorter than patella + tibia on the fourth pair of legs and broader than the fourth tibia. It is broadly oval, broadly truncated in front, very high and the pars cephalica very indistinctly separated from the pars thoracica. — *Eyes.* The front-row nearly straigth. The middle-eyes larger than the lateral ones and the space between the eyes and the margin of clypeus broader than the diameter of the eyes. The eyes of the middle-row largest of all and the space between them about as broad as the diameter of the central anterior eyes. The space between the posterior eyes about thrice the diameter of them and the space between them and the eyes of the middle-row about as long as the diameter of the posterior eyes. — *Sternum* nearly round and black, strewed with short black hairs. — *Maxillæ* of the same colour and more than twice as long as the black labium, which is broadly truncated. — *Chelicceres* nearly black, clothed with short grayish hairs, broader than the femur and shorter than the tibia of the 1st pair of legs. — *Legs* 4, 1, 2, 3, clothed with light gray hairs, the end-joints a little darker and the coxæ black. The two first legs have on the femur 1. 1. 1 spines above; on the inner side nearly the apex has the first 1. 1 and the second 1 spine; in the middle on the inner side of patella often one short spine; the tibia below 2. 2. 2 spines. — *Abdomen* oblong, light gray-coloured with numerous very small darker spots and a darker middle-stripe more or less visible, on each side with a small darker dot. The sides of abdomen lighter and the venter black. The *vulva* consist of a very long and narrow fovea with a very narrow and low septum; the transverse costa at its hind-end about thrice shorter than the septum.

Measurements:

length of cephalothorax	11,8	mm.
breadth » »	8,5	»
total length	21,5	»
length of 1st leg	31	»
» » 4th »	38,2	»

Male. — Very like the female. Measurements of the largest specimen:

length of cephalothorax	11	mm.
breadth » »	8,5	»
total length	20	
length of 1st leg	30	
» » 4th »	38,2	

The genital bulb conf. the fig. 20.

Of this species Mr. LÖNNBERG has captured six adult females and two males at Oakland and Orlando in Orange co. This species seems me to be nearly related to L. horrida KEYSERLING, but has several reable characteristics so that it deserves to be described as a new species. Besides the difference in colour and hairiness the cheliceres are shorter than the tibia of first leg, the anterior row of eyes nearly straight and more separated from the margin of clypeus, the vulva narrower and longer.

One female shows on the hind part of the dorsal side of the abdomen four transversal, a little curved white lines. The middle stripe is very distinct and the sides of abdomen are nearly grayish blue.

39. **L. albopunctata** n. sp.

(Fig. 8 a—b).

Female. — *Cephalothorax* dark brown clothed with brown-yellowish hairs and some few long upturned bristly dark hairs. A light yellowish fine stripe between the four posterior eyes, in the middle of cephalothorax joined with two fine side-stripes and thence going to the hind edge of cephalothorax. At the margins broad grayish brown bands. The length is a little shorter than patella + tibia and the breadth a little greater than the length of the tibia of the fourth pair of legs. It is oval, truncated in front, high, and the pars cephalica is very indistinctly separated from the pars thoracica. — *Eyes*. The front-row a little procurved, the central eyes largest and separated from the margin of clypeus by a space about as long as the diameter of the central eyes. The middle-row of eyes separated from the anterior central eyes by a space about as long as their diameter. The two middle-eyes separated by a space about as long as their diameter and the distance from the posterior eyes longer than the former. — *Sternum* black, rounded, strewed with short adpressed and long black upturned bristly hairs. — *Maxillæ* of the same colour and more than twice as long as the black labium. — *Cheliceres* dark brown, lighter at the apex, strewed with short dark hairs, about as broad as the first femur and a little shorter than the first tibia. — *Legs* 4, 1, 2, 3, clothed with brown hairs, above darker and with irregular spots; coxæ black. The two first femora with

1. 1. 1 spines above, 2. 1 spines on the inner side, coxæ without spines, tibia with 2. 2. 2 spines below. — *Abdomen* oblong, dark brown with an indistinct middle stripe, tapering towards the middle, with four or five pair of very small white spots. The sides a little lighter and the venter black. — The *vulva* conf. the fig. 8.

Measurements:

	(a little sp.)	(a large sp.)
length of cephalothorax . .	7,3 mm.	8,8 mm.
breadth » » . .	5,5 »	6 »
total length	15,5 »	19,5 »
length of 1st leg	18 »	20,5 »
» » 4th »	21 »	25 »

The two specimens resemble each other in every respect except with regard to the vulva and the size. The small specimen has a vulva (fig. 8 b) like that of L. immaculata Banks and L. oblonga Banks and the larger specimen a vulva (fig. 8 a) very like that of L. nidicola Emerton. I am convinced of the two specimen in my collection being identical. I believe also that the two forms of the vulva only are different stages and that perhaps the species of Mr. Banks is only represented by young specimens of other species.

40. **L. tigrina** Mc Cook.

One single male from Oviedo in Orange co.

41. **L. (Pirata) Loennbergi** n. sp.

(Fig. 10).

Female. — *Cephalothorax* dark brown with a yellow brown narrow stripe in the middle from the posterior margin to the posterior eyes, at the margins broad grayish bands, yellowish on the pars cephalica. Between the middle and the lateral band a dark brown space with lighter radiating fine stripes. In addition to the short adpressed hairs it has on the pars cephalica and especially on the area of eyes very long, black upturned bristly hairs. It is a little longer than the patella + tibia and as broad as the length of tibia of the fourth pair of legs. The front is about half as broad as the pars thoracica. *Eyes.* The front-eyes about equal and the row distinctly procurved. The lateral eyes a little prominent. The space betweeen them equal and the distance to the margin of the clypeus about twice as long as its diameter. The eyes in the middle-row largest of all and separated from each others and from the front-eyes by a space as broad as their diameter. The distance to the posterior ones a little longer. These are separated by a very long interspace. The front-row a little longer than the middle-row, but shorter than the posterior one. — *Sternum* light yellowish brown, densely clothed with long white hairs. — *Maxillæ* longer than labium, light yellow, rounded at the apex and clothed with long white—black bristly hairs. — *Cheliceres* dark brown, nearly black, with short adpressed grayish hairs, shorter than the tibia of first leg and broader than the femur. The claw red-brown. — *Legs* 4. 1. 2. 3, light grayish brown, above on the femora with three dark spots, the other joints darker above. The two first legs with very dense blackish scopulæ. The femora of the first pair with 1. 1 spines above the other femora with 1. 1. 1 spines above; the first femora on the inner side with 2. 1 spines; patellæ without spines and the tibiæ of the two first pairs with 2. 2. 2 spines below. *Abdomen* oval, very densely clothed with short yellowish black and white hairs and strewed with long black bristly hairs. Along the middle a broad dark band with yellow bands at the margins. The sides of the abdomen grayish with irregulary black spots. The venter light yellowish gray. The superior mammillæ very long, densely clothed with very long bristly dark hairs. — The vulva reddish, conf. the fig. 10.

Measurements:

length of cephalothorax	8,6 mm.
breadth » »	6,2 »
total length	13,5 »
length of 1st leg	24,5 »
» » 4th »	31 »

One single female from Arcadia in De Soto co.

42. L. (Pirata) transversolineata n. sp.

(Fig. 11).

Female. — *Cephalothorax* very dark red-brown, with a very narrow gray stripe in the middle from the middle-row of eyes to the hind-edge of cephalothorax and with a narrow gray band at the lateral margins. Densely clothed with short adpressed and strewed with long upturned bristly hairs especially in the area of eyes. It is about as long as the tibia + patella and a little broader than the lenght of the tibia of the fourth pair of legs. The front is a little broader than half of the breadth of pars thoracica. — *Eyes.* The front-row distinctly procurved; the lateral eyes a little larger and prominent. The space between the lateral eyes larger than between the central eyes. The space between the lateral eyes and the margin of clypeus about as long as the diameter of eyes. The eyes of the middle-row largest and the space between them about as long as their diameter and a little longer than the distance from the lateral anterior eyes. The space between the middle and the posterior eyes a little longer than the diameter of the middle-eyes. — *Sternum* dark brown with long brownish hairs. — *Maxillæ* very curved, dark red-brown with bristly hairs, about twice as long as the squarish labium. — *Chelicercs* black, with long dark bristly hairs, broader than the femur and a little shorter than the tibia of first pair. The claw black. — *Legs* 4, 1, 2, 3, dark red-brown, on femur and in the middle of tibia grayish spots. The femur with 1. 1. 1 spines above, at the apex of the inner side of first femur 2 and of second femur 1 spine, the patella without and the tibia below with 2. 2. 2 spines. — *Abdomen* above dark grayish brown, darkest in the middle, with two very small white spots on the front-part and 3 or 4 very fine white transverse lines on the hind-part. The sides of abdomen nearly white with black irregular spots. The venter light grayish brown with 4 dark longitudinal lines, two in the middle and one on each side divergent forwards and ending at the rima genitalis. — The vulva very like it of fig. 10 (conf. fig. 11).

Measurements:

length of cephalothorax	7,2 mm.
breadth » »	5 »
total length	13 »
length of 1st leg	17,5 »
» » 4th »	22 »

Females from Victoria, Lake co.; Lake Leonore one juv. male from Arcadia in De Soto co.

43. **L. scutulata** 1842.

One single young female from Orlando in Orange co.

Pardosa C. Koch 1848.

44. **P. rufa** Keyserling 1876.

Two ad. females from Lake Leonore.

45. **P. bilobata** n. sp.

(Fig. 12).

Female. — *Cephalothorax* light brown, clothed with short dark adpressed hairs and strewed with long dark upturned bristly hairs. The pars cephalica with 3 lighter bands and at the margins of pars thoracica a broad light band. A long and distinct central furrow on pars thoracica. The length a little shorter than the length of tibia and patella and the breadth shorter than the length of tibia on the fourth pair of legs. — *Eyes.* The front-row distinctly procurved. The intervals about equal. The central eyes nearly twice as larg as the lateral eyes. The interspace between the central eyes and the margin of clypeus as long as the diameter of the eyes. The eyes of the middle-row separated from eachother by an interspace about as broad as their diameter and separated from the central anterior eyes by an interspace about as long as the diameter of these eyes. The distance from the posterior eyes a little longer than the diameter of the middle eyes. — *Sternum* light brown, nearly cordated, clothed by long black bristly hairs. — *Maxillæ* about twice as long as labium, yellow and clothed by long bristly hairs. — *Cheliceres* about twice as long as the face, tapering at the apex, light brown and strewed with long bristly hairs. — *Legs* pale brown, with 2. 2. 2 spines beneath. *Abdomen* is inversely ovate, above dark brown with a lighter middle band and three pair of very small white spots; the venter light yellowish brown. The *vulva* bilobated, dark carneous (conf. the fig. 11).

Measurements:

length of cephalothorax	2,5	mm.
breadth » »	1,8	»
total length	3,8	»
length of 1st leg	6,8	»
» » 4th »	8,6	»

Two adult females from Lake Leonore in Orange co.

46. **P. longispinata** n. sp.

(Fig. 13).

Female. — *Cephalothorax* dark brown, clothed with short adpressed and long black upturned bristly hairs, with a white middle-band, squarish in the cephalic part as broad as the area of eyes, on the pars thoracica narrow; the area of eyes nearly black; at the margins broad white bands; the margin black. The length a little shorter than the length of tibia + patella and the breadth shorter than the length of tibia on the fourth pair of legs. — *Eyes*. The front-row distinctly procurved, the central eyes largest and the interspace between the central eyes about equal to their diameter and longer than the space between the lateral eyes. The distance from the lateral eyes to the margin of clypeus and to the eyes in the middle-row about thrice their diameter. The eyes of the middle-row very large and the interspace between them longer than their diameter. The interspace between the middle and the posterior eyes broader than the diameter of the middle-eyes. — *Sternum* small oval light brown, with long light hairs. — *Maxillæ* and labium light yellow brown. — *Cheliceres* a little longer than the face, very tapering at the apex and clothed with long bristly hairs, a little narrower than the femur of first pair. — *Legs* pale brown with dark rings, the tibia of the first pair below with 2. 2. 2 spines; these and other spines very long. — *Abdomen* oval, brown, clothed with black and white short hairs without distinct markings; the venter light grayish. The *vulva* conf. the fig. 13.

Measurements:

length of cephalothorax	2,5 mm.
breadth » »	1,8 »
total length	4,2 »
length of 1st leg	7,3 »
» » 4th »	10 »

One single ad. female from Lake Leonore in Orange co.

Fam. **Oxyopidæ.**

Peucetia Thorell 1870.

47. **P. viridans** (Hentz) Marx 1889.

Several specimens from Orlando and Clarcona in Orange co.

Oxyopes Latr. 1804.

48. **O. salticus** Hentz 1845.

Syn. O. gracilis Keyserling 1876.

Several adult females and one adult male from Orange co.

49. **O. laminatus** n. sp.

(Fig. 14).

Female. — *Cephalothorax* light yellow-brown, densely clothed with white scales, the hind-part with a black irregular spot on each side; the middle-furrow very long and fine. It is very high, highest in front. Pars cephalica indistinctly separated from pars thoracica. — *Eyes* in four rows, situated on black spots. The two of the second row counted from clypeus a little larger, the two of the first row about as much separated from the margin of clypeus as from the eyes in the fourth row. The interspace between the eyes in the third and the fourth row a little larger than that between the eyes of the second and the third row. *Cheliceres* conical, light yellow-brown with a blackish spot at the base, about as long as the face and much longer than the patella of the first leg. — *Sternum* cordated, about as long as broad, clothed with white scales and long black bristly upturned hairs, yellow in the middle part and black at the margins. — *Maxillæ* about twice as long as the sqarish labium a little convergent at the apex and a little broader in the anterior part, clothed with short adpressed blackish hairs and some few upturned curved bristly hairs. — *Legs* yellow-brown with dark rings; the larg claws with 15 teeths more or less; the joints of the first pair of legs have: on the femur above 1. 1. 1 spines, in front 2 and behind 1 spine, below two rows fine bristly hairs; on the patella 1. 1 above and 1 spine behind; on the tibia above 1. 1, in front 1, behind 1 and below 2. 2 spines; on the metatarsus at the base 4, in the middle 4 and at the apex 5 spines. — *Abdomen* densely clothed with white scales; in the middle a darker band, tapering towards the central part, and behind that three light spots. The sides with irregular blackish spots on light yellow-brown ground. The venter with a dark central band from the rima genitalis to the mammillæ. The *vulva* yellow-brown with blackish margin (conf. the fig. 14).

Measurements:

length of cephalothorax	2 mm.
breadth » »	1,5 »
total length	5,5 »
length of 1st leg	7 »
» » 4th »	7,5 »

One single female from Orange co.

Fam. **Attidæ.**

Phidippus C. Koch 1850.

50. **Ph. miniatus** Peckham 1883.

Ad. females from Oakland and Orlando in Orange co. The measurements of a large female:

length of cephalothorax	7,0 mm.
breadth » »	6,0 »
total length	16,8 »
length of 1st leg	15,0 »
» » 4th »	15,0 »

51. **Ph. morsitans** (Walck.) Peckham 1888.

Four ad. males from Orange co. I give here a description of one of them.

Male. — *Cephalothorax* black, with two broad white lateral bands, strewed with short hairs and having long black hairs near the small median eyes. Clypeus with long and short dark hairs. — *Eyes.* The front-row very recurved with the lateral eyes separated from the central eyes by $^{2}/_{3}$ their diameter. The central eyes separated from the margin of clypeus by $^{2}/_{3}$ their diameter. — *Legs* 1. 4. 2. 3; the patellæ always shorter than the tibiæ. On the sides of patella of first pair large brushes of white hairs are found. On the front-side of the other patellæ and on the base of the tarsi and the metatarsi white hairs. — *Abdomen* black; at the middle are two small white spots; behind these are two larger, somewhat oblique, white spots and lower down two minute white dots; around the base a broad white band and on the sides, between the ends of this and the middle spots, an oblique white spot. The venter perfectly black.

Measurements:

length of cephalothorax	6,5	mm.
breadth » »	5,5	»
total length	13,0	»
length of 1st leg	16,0	
» » 4th »	13,0	

52. **P. bilineatus** n. sp.

(Fig. 15).

Female. — *Cephalothorax* dark red, black in the eye-region with some grayish and black upturned bristly hairs on the sides and between the eyes and with some short black hairs strewed on the thoracical part. Clypeus red with some grayish hairs. — *Eyes.* The front-row a little recurved with the lateral eyes separated from the central eyes by $^1/_2$ their diameter. The central eyes separated from the margin of clypeus by an interspace not as long as their radius. The eyes of the middle-row twice as far from the posterior as from the anterior lateral eyes. — *Chelicercs* very divergent, bright iridescent green on the front-side. — *Sternum* oval, a little convex, dark brown. — *Maxillæ* at the apex rounded, without projecting, about $^1/_3$ longer than the labium. This nearely triangular, truncated at the apex. — *Legs* 4. 1. 2. 3. dark reddish brown and with blackish rings at the apex of the joints, clothed with short grayish and long black bristly hairs. The patellæ always shorter than the tibiæ. *Abdomen* on the dorsal side black with a narrow white band around the base and on the lateral parts a broad yellowish red band. The central longitudinal part black, in the middle of the posterior part very dark brown. The venter blackish brown with a broad bright white band from the rima genitalis tapering to near the spinners. The whole abdomen clothed with hairs, which are short and adpressed and of different colour. The white hairs on the venter have the scape of scales. — The *vulva* very like that of Ph. rauterbergii PECK. (conf. fig. 15).

Measurements:

length of cephalothorax	4,2	mm.
breadth » »	3,5	»
total length	9,0	»
length of 1st leg	9,1	»
» » 4th »	10,0	»

One single adult female from Orange co.

53. **Ph. oaklandensis** n. sp.

(Fig. 16).

Female. — *Cephalothorax* dark reddish, densely clothed with light brown-gray hairs on the thoracical part and with blackish hairs between the two posterior rows of eyes. Between the front-eyes and on the clypeus white hairs. Besides strewed with long, upturned, bristly black hairs. — *Eyes*. The front-row nearely straight with the lateral eyes separated from the central eyes by $^{1}/_{2}$ their diameter. The central eyes separated from the margin of clypeus by nearely $^{2}/_{3}$ their diameter. The eyes of middle-row twice as far from posterior as from anterior lateral eyes. — *Cheliceres* a little divergent, bright iridescent blue on the anterior part of the front side. — *Sternum* oval, very convex, deep and light red-brown. — *Maxillæ* rounded at the apex, without projecting, about $^{1}/_{3}$ longer than the labium. This is broadly truncated at the apex. — *Legs* 4. 1. $\overline{2.\ 3}$ dark reddish brown with blackish rings at the apex of the joints and clothed with short and long grayish hairs. At the ends of femur, patella and tibia very narrow white rings. — The patella and tibia of the legs II and III equal in length. — *Abdomen*. The dorsal part light orange yellow with two longitudinal black bands, interrupted and indistinct in the front-part. In this part two pairs of posteriorly divergent very fine, white stripes and in the posterior part two pairs of white spots. Around the front of abdomen a narrow white band and on the posterior part of the brownish sides of the abdomen an oblique narrow white stripe. The venter yellowish brown, densely clothed with gray hairs. — The *vulva* conf. fig. 16.

Measurements:

length of cephalothorax	4,0 mm.
breadth » »	3,5 »
total length	11,4 »
length of 1st leg	8,2 »
» » 4th »	9,2 »

One single female from Oakland in Orange co.

54. **Ph. clarconensis** n. sp.

(Fig. 17).

Female. — *Cephalothorax* dark brown, the cephalic part black, densely clothed with brown and gray short, adpressed hairs and in the region of eyes strewed with long, bristly, upturned hairs. Clypeus clothed with long white hairs. — *Eyes.* The front-row a little recurved with the lateral eyes separated from the central eyes by their radius. The central eyes separated from the margin of clypeus by $^1/_3$ their diameter. The eyes in the middle-row twice as far from the posterior as from the anterior lateral eyes. — *Cheliceres* divergent, bright iridescent green on the front-side. — *Sternum* oval, a little convex, dark brown. — *Maxillæ* rounded at the apex, without projecting, about $^1/_2$ longer than the broadly truncated labium. — *Legs* 4. 1. 3. 2 dark brown with blackish rings at the apex of the joints, densely clothed with long black and grayish hairs. — The patellæ and tibiæ on the 2. and 3. legs about equal in length. — *Abdomen* on the dorsal side olive-brown with two longitudinal indistinct, blackish bands on the posterior part. A broad white band around the front. On the sides in the posterior part a short oblique white stripe. The venter grayish with two darker brown, longitudinal anteriorly divergent bands. — The *vulva* conf. fig. 17.

Measurements:

length of cephalothorax	4,2 mm.
breadth » »	4,0 »
total length	10,9 »
length of 1st leg	10,2 »
» » 4th »	10,4 »

One single female from Clarcona in Orange co.

Dendryphantes C. Koch 1837.

55. **D. capitatus** (Hentz) Peckham 1888.

A male and a female from Orange co, probably belonging to this species. The male measured only 3,8 mm.

Icius Simon 1876.

56. **I. palmarum** (Hentz) Peckham 1883.

Two males from Orange co.

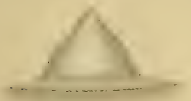
Menemerus Simon 1869.

57. **M. paykulli** (Aud. et Sav.) Thor. 1881.

Several specimens from Ozona and Orlando in Orange co.

Explanation of the plate.

Fig. 1. Theridium tepidariorum Koch. var., vulva (*a* under side, *b* upper side, *c* from the side).
2. Lathrodectes mactans (Fabr.), vulva.
3. Linyphia communis Hentz, vulva.
4. Aysha orlandensis n. sp., vulva.
5. Gea heptagon (Hentz), *a* region of eyes, *b* bulbus.
6. Argiope argentata (Fabr.), dorsal markings.
7. Lycosa angusta n. sp., *a* vulva, *b* bulbus.
8. » albopunctata n. sp., vulva.
9. » arenicola Scudder, vulva.
10. » Loennbergi n. sp., vulva.
11. » transversolineata n. sp., vulva.
12. Pardosa bilobata n. sp., vulva.
13. » longispinata n. sp., vulva.
14. Oxyopes laminatus n. sp., vulva.
15. Phidippus bilineatus n. sp., vulva.
16. » oaklandensis n. sp., vulva.
17. » clarconensis n. sp., vulva.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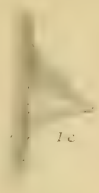
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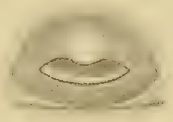
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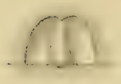
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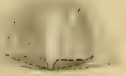
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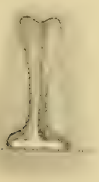
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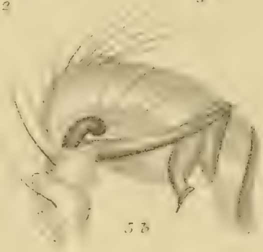
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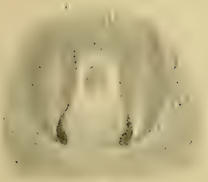
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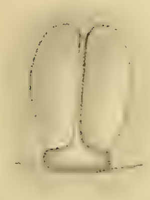
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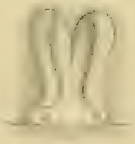
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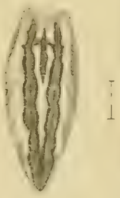
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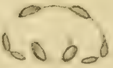
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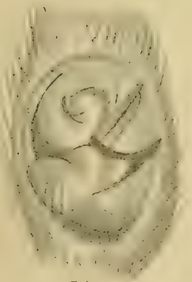
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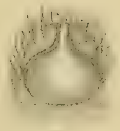
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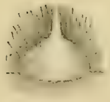
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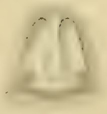
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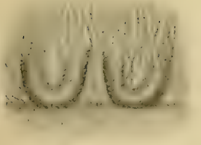
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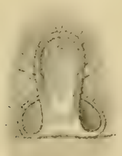
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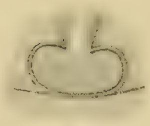
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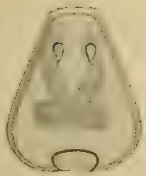
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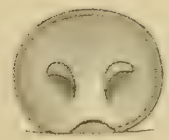
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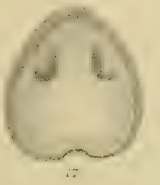
17

A. Tullgren del.

Lith. G. Tholander, Stockholm.

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 2.

UEBER
EINE MOLLUSKENFAUNA
VOM
GREY HOOK AUF SPITZBERGEN.

VON

E. KAYSER.

MIT ZWEI TAFELN.

MITGETHEILT AM 13 FEBRUAR 1901.
GEPRÜFT VON G. LINDSTRÖM UND HJ. THÉEL.

STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1901

Vorbemerkungen.

Im Jahre 1882, als ich meinen Wohnsitz noch in Berlin hatte, erhielt ich durch die Herrn Professoren G. Lindström und A. G. Nathorst eine Anzahl Versteinerungen, die der letztgenannte Forscher im Sommer desselben Jahres vom Museum in Tromsö entliehen hatte. Sie waren auf Spitzbergen, auf der an der Nordküste der Insel (zwischen der Liefde Bay und der Wijde Bay) gelegenen Halbinsel Grey Hook von einem norwegischen Fangschiffer gesammelt worden. Nathorst war geneigt diesen Fossilien, die abgesehen von sehr fragmentären Fischresten nur aus kleinen Ostracoden und einigen Zweischalern bestanden, ein devonisches Alter zuzuschreiben; leider war aber ihre Erhaltung so ungenügend, dass ich es nicht wagte eine bestimmte Ansicht über ihr Alter auszusprechen.[1]

Im Sommer 1898 hat nun Professor Nathorst die genannte Örtlichkeit selbst besucht und dort mit Unterstützung der Herrn J. G. Andersson und Dr. A. Hamberg sehr umfangreiche Aufsammlungen von Fossilien vorgenommen. In der Hoffnung, dass diesmal eine sichere Altersbestimmung möglich sein würde, bot Herr Nathorst mir vor etwa zwei Jahren die Bearbeitung dieser Fossilreste an. Ich theile die Ergebnisse meiner Untersuchungen, deren Abschluss sich aus verschiedenen Gründen bis jetzt verzögert hat, im Folgenden mit. Infolge der grossen Armuth und Eintönigkeit der Fauna habe ich zwar leider auch diesmal keine ausreichenden Anhaltspunkte zur Feststellung ihres geologischen Horizontes gewonnen; glücklicherweise aber hat unsere Kenntniss der stratigraphischen Verhältnisse Spitzbergens inzwischen solche Fortschritte gemacht, dass das

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[1] Zeitschr. d. deutsch. geolog. Ges. Bd. 34, 1882, p, 818.

Alter der Fauna auch unabhängig von ihrer faunischen Beschaffenheit ziemlich gesichert erscheint.

Wie bekannt, zerfällt die Gesammtheit der am Aufbau Spitzbergens betheiligten Gesteine in eine ältere, stark gefaltete, und eine jüngere, wesentlich ungefaltete Schichtenreihe. Der ersten gehört ausser dem Grundgebirge noch die aus Quarziten, Phylliten, Kalken und Dolomiten zusammengesetzte sog. **Hekla-Hook-Formation** an, die nach neueren Beobachtungen auf der Bäreninsel zu schliessen[1] wenigstens theilweise noch dem Silur angehört. Die jüngere, ungefaltete Gesteinsreihe beginnt mit den **Liefde-Bay-Schichten**, einer mächtigen Folge überwiegend rother und grüner Sandsteine, Grauwacken und Schiefer, über welchen unmittelbar **carbonische** (und höher aufwärts permische und triassische u. s. w.) **Ablagerungen** folgen.

Abgesehen von älteren Arbeiten von NORDENSKIÖLD und Anderen, verdankt man diese Feststellungen besonders Herrn NATHORST, der 1894 nachwies, dass die carbonischen Bildungen Spitzbergens an der Basis eine **culmähnliche Flora** mit *Lepidodendron Veltheimianum*, *Sphenopteris bifida*, *Cardiopteris* u. s. w. einschliessen, während die unterliegenden Liefdebay-Schichten eine ganz verschiedene (durch *Bergeria*, *Lepidodendron*, *Psygmophyllum* u. a. gekennzeichnete) Flora enthalten, welche NATHORST **als devonisch** angesprochen hat.[2]

Die Zugehörigkeit der Liefdebay-Schichten zum Devon war schon früher durch die Untersuchung der in Begleitung der Pflanzen vorkommenden, von NATHORST gesammelten Fischreste durch RAY LANCASTER[3] und SMITH WOODWARD[4] dargethan worden. Diese hatte nämlich ergeben, dass die Fische theils — wie *Pteraspis* und *Acanthaspis* — auf einen tiefen, theils — wie *Psammosteus* — auf einen hohen Horizont des Old Red hinweisen, dem diese Formen in England, Russland und Amerika angehören. An das Old Red erinnert auch die rothe Färbung und sonstige petrographische Beschaffenheit der Liefdebay-Schichten, so dass durch die genannten Arbeiten **nicht nur deren devonisches Alter, sondern auch ihre Zugehörigkeit zur Old Red-Facies des Devon** erwiesen wurde.

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[1] A. G. NATHORST, Om 1898 års svenska polarexpedition, Ymer 1898, p. 329; Upplysningar till den nya kartan öfver Beeren Eiland, Ymer 1899, p. 181. G. ANDERSSON, Stratigraphie u. Tektonik der Bären-Insel (Bull. geolog. instit. of Upsala, 1899).

[2] Svenska Vet.-Akad. Handl. XXVI, N:r 4.

[3] RAY LANCASTER, Svenska Vet.-Akad. Handl. XX, N:r 9.

[4] SM. WOODWARD, Ann. Mag. Nat. Hist. 1891.

Ausser den Pflanzen und Fischen ist in den in Rede stehenden Schichten nur noch eine *Leperditia* vorgekommen, die R. Jones als *isochilinoides*, und eine *Estheria*, die er als *Nathorsti* beschrieben hat.[1]

Was nun die im Folgenden zu beschreibenden Mollusken betrifft, so sind diese nach den mir von Herrn Nathorst gemachten Mittheilungen zuerst von C. W. Blomstrand[2] beobachtet worden, der in einem Bericht über eine Reise nach Spitzbergen mittheilt, dass die an der Westseite der Wijde Bay und in der Liefde Bay anstehenden rothen und grünen Sandsteine auf der zwischen beiden Buchten liegenden Halbinsel Grey Hook durch dunkle muschelführende Thonschiefer mit darin eingelagerten harten grauen Sandsteinen ersetzt würden. Ob diese Schichten älter oder jünger seien als die rothen und grünen Sandsteinen der Liefdebay-Formation, konnte Blomstrand aus Zeitmangel nicht feststellen.

Auch Nordenskiöld[3] erwähnt in seiner bekannten, von einer geologischen Kartenskizze begleiteten Abhandlung über die Geologie Spitzbergens vom Jahre 1867 das Vorkommen von Versteinerungen am Grey Hook, sagt aber darüber nur aus, dass sie solchen des Spitzberger Jura ähnlich, im Übrigen aber nicht näher bestimmbar seien.[4]

Auch in einem späteren Aufsatz über die Geologie des Eisfjords und Belsunds[5] kommt Nordenskiöld auf die Fossilien vom Grey Hook mit folgenden Worten zurück: »einige schlecht erhaltene und unbestimmbare Bivalven und undeutliche graptolithenähnliche Abdrücke kommen an der äussersten Spitze des Grey Hook vor und zwar in einem schwarzen

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[1] R. Jones, Ann. Mag. Nat. Hist Oct. 1883.

[2] Blomstrand, Svenska Vet.-Akad. Handl. IV, N:r 6.

[3] Nordenskiöld, Svenska Vet.-Akad. Handl. VI, N:r 7.

[4] l. c. p. 3. Vergl. auch die englische Ausgabe desselben Aufsatzes (Sketch of the geology of Spitzbergen, 1867), wo es in der Fussnote d. p. 29 heisst:» From the strata at Grey Hook Blomstrand, also, collected some fossils, *probably* belonging to the jurassic formation. They were, however, to indistinct to be definitely determined; and the age of these strata is, therefore, not fully decided.»

[5] Geolog. Föreningens i Stockholms Förhandlingar, IX, 1875, p. 243.

Schiefer, der wahrscheinlich der Stufe 4 der Heklahook-Schichten angehört.»

Da nun die Heklahook-Schichten älter sind als die Liefdebay-Schichten, und da NORDENSKIÖLD diese als Grenzhorizont von Carbon und Devon auffasst, so ist mit den angeführten Worten indirekt die Ansicht ausgesprochen, dass die Greyhook-Schichten dem Devon oder einer noch älteren Formation angehören.

In unzweideutiger Weise ist die Zugehörigkeit der Greyhook-Schichten zum Devon erst von Prof. NATHORST in seiner oben erwähnten Abhandlung aus dem Jahre 1894 ausgesprochen und auch auf der dort befindlichen geologischen Karte von Spitzbergen (die sich in unveränderter Gestalt auch in SUESS' »Antlitz der Erde», Bd 2, p. 85 wiederfindet) zum Ausdruck gebracht worden.

Bei seinem letztem Besuch der Inselgruppe im August 1898 ist Herr NATHORST leider durch widrige Witterungsverhältnisse verhindert worden die Ostseite der Liefdebay sowie die Abhänge der Wijdebay zu untersuchen, um so zu einem sicheren Urtheil über die stratigraphischen Beziehungen der dunklen muschelführenden Schichten zu den rothen und grünen Sandsteinen zu gelangen. Soweit er aber die Verhältnisse mittels des Fernrohres übersehen konnte, gewann er durchaus den Eindruck, dass die Schiefer jünger seien als die Sandsteine. Da diese letzten unzweifelhaft devonisch sind, so können nach seiner Überzeugung die Greyhook-Schichten nur **dasselbe devonische** oder allenfalls ein noch etwas jüngeres, d. h. untercarbones Alter besitzen.

Über die petrographische Beschaffenheit und Lagerung der Greyhook-Schichten sowie die Art des Auftretens und die Erhaltungsweise der Fossilien habe ich Folgendes mitzutheilen.

Das herrschende Gestein des Grey Hook, wie es sowohl an der Küste als auch im Inneren der Halbinsel zu beobachten ist, bildet ein uneben spaltender, schwarzer, feinglimmeriger Thonschiefer, der in einzelnen Lagen von weicher, schieferthonartiger Beschaffenheit ist, während er in anderen, vielleicht in Folge eines kleinen Gehaltes an Kalkeisencarbonat, eine beträchtliche Härte erlangt. Wie schon BLOMSTRAND mitgetheilt hat, enthält der Schiefer im unteren Theile zahlreiche Einlagerungen von harten, sandigen Gesteinen. In frischem Zustande stellen diese in der Regel hellgraue, ziemlich feinkörnige, quarzreiche Grauwackensandsteine dar, während sie sich bei der Verwitterung bräunlich und gelblich färben.

Beiderlei Gesteine sind, soweit sie an den wenige Meter hohen Wänden, mit denen die Landzunge nördlich des Grey Hook ins Meer abfällt, entblösst sind, stark aufgerichtet und gepresst. Auch am Grey Hook selbst sieht man deutlich wellenförmige Falten. Da aber dieselben Schichten in einiger Entfernung von der Küste ungefaltet sind, so erklärt NATHORST ihre steile Stellung im Uferprofile und ihre Faltung am Grey Hook aus der Annahme, dass sie hier, in der Nachbarschaft einer grossen Grabenversenkung, örtlich gestaut seien.[1]

Die Versteinerungen, die, wie schon oben bemerkt, zum allergrössten Theil an der Küste gesammelt wurden, die sich aber nach den Beobachtungen von HAMBERG ebenso auch im Grey Hook selbst wiederfinden, kommen sowohl in den sandigen als auch in den schiefrigen Gesteinen vor, scheinen aber in den letzten häufiger zu sein. Sie treten hauptsächlich lagenweise auf, indem sie in grossen Massen einzelne Schichtoberflächen bedecken oder auch ganze Bänke erfüllen. Nach dem mir vorliegenden Material zu urtheilen, besteht in faunistischer Hinsicht zwischen den sandigen und schiefrigen Gesteinen kein wesentlicher Unterschied. *Avicula Nordenskiöldi*, die häufigste Art der Fauna, kommt in beiderlei Gesteinen vor, und auch die interessante *Nathorstella semiplicata*, die in den Schiefern in Masse auftritt, hat sich wenigstens in einem zweifellosen Exemplare auch in der Grauwacke gefunden. Andererseits muss zugestanden werden, dass das einzige mir vorliegende Exemplar einer *Myalina* aus der Grauwacke stammt, während ich umgekehrt die *Anthracosia*-ähnlichen Muscheln, die ich bei *Palæanodonta* und *Palæomutela* unterbringe, nur im Schiefer beobachtet habe. Weitere Unterschiede beider Gesteine sprechen sich darin aus, dass Fischreste nur in der

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[1] Vergl. die oben erwähnte Kartenskizze in SUESS' Antlitz der Erde, aus der deutlich zu ersehen ist, dass die Gesammtheit der Grey Hook- und Liefdebay-Schichten in diesem Theile von Spitzbergen den Grund einer grossen, südnördlich streichenden Grabensenke einnehmen, die im W wie O von älteren Gesteinen begrenzt wird.

Grauwacke, Pflanzenreste dagegen nur im Schiefer vorzukommen scheinen.

Die Erhaltungsweise der Fossilien ist leider im Ganzen eine sehr ungünstige. Von Fischen finden sich in meinem Material nur kleine Knochentrümmer von schwarzer oder bläulicher Farbe. Sie sind in einigen Grauwackenbänken in grosser Menge vorhanden.[1] Von Pflanzen treten nur isolirte, stark macerirte Stengeltheile auf.[2] Bei den uns hier allein interessierenden Mollusken endlich ist die ursprüngliche Kalkschale nur in ganz seltenen Fällen erhalten geblieben; unter den abgebildeten Stücken nur bei der *Myalina* t. I, f. 6. In der Regel liegen sie nur in Steinkernen und Abdrücken vor. Fast in allen Fällen aber haben sie durch den Gebirgsdruck ausserordentlich gelitten und sind dadurch entweder ganz zerquetscht oder so verzerrt worden, dass es oft schwer fällt ihre ursprüngliche Gestalt festzustellen.

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[1] Eine analytische Prüfung im hiesigen chemischen Laboratorium ergab einen deutlichen Gehalt dieser Trümmer an Phosphorsäure.

[2] Nach einer freundlichen Mittheilung von NATHORST handelt es sich wahrscheinlich um Theile um *Psilophyton* oder Farnspindeln. Derartige, nicht selten mit einem mattglänzenden, dünnen, weisslichen Glimmer-(Gümbelit?) Häutchen überzogene Stengelreste sind es, die NORDENSKIÖLD seinerzeit für Graptolithen gehalten hat.

Beschreibung der Arten.

Avicula Nordenskiöldi n. sp.

Taf. I, Fig. 1—5.

Beide Klappen mässig stark gewölbt, von subquadratischem Umriss. Der gerade Schlossrand nicht ganz so lang wie die in der zweiten Hälfte der Muschel gelegene grösste Breite. Wirbel am äussersten Vorderende des Schlossrandes liegend, klein und wenig vorragend. Vorder- und Hinterrand schwach gebogen, Unterrand stark gerundet. Hinterseite in einen kurzen, oben rechteckig endigenden, übrigens wenig scharf begrenzten Flügel auslaufend. Oberfläche mit 12—18 am Wirbel beginnenden, kräftigen, rasch an Breite zunehmenden, flach gerundeten, durch schmale Furchen getrennten Falten verziert. Ausgewachsene Individuen erreichen eine Breite von etwa 3 und eine Höhe von 3—3$^1/_2$ cm.

Die Muschel stellt eine der häufigsten Arten der Fauna dar und kommt sowohl in den Grauwackensandsteinen als auch in den Schiefern vor. Für die Gattungsbestimmung ist ausser der äusseren Gestalt besonders die lange, schmale, feingestreifte Ligamentarea, wie sie an zwei Stücken beobachtet wurde und in fig. 2 abgebildet ist, massgebend gewesen. Spuren von Zähnen konnten an keinem Exemplar mit Sicherheit beobachtet werden. Die Schale scheint im Allgemeinen ziemlich dünn und nur in der Umgebung des Wirbels etwas dicker gewesen zu sein.

Ich benenne die Species zu Ehren des um die Erforschung der Polarländer und speciell Spitzbergens so hoch verdienten Barons A. E. NORDENSKIÖLD.

Avicula? Spitzbergensis n. sp.

Taf. II, Fig. 6.

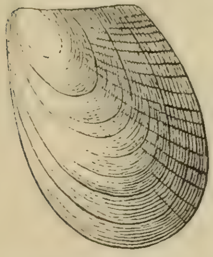
Ausser *A. Nordenskiöldi* scheint unsere Fauna mindestens noch eine zweite Aviculide besessen zu haben, die ich nur in den Schiefern beobachtet habe. Falls unsere nach dem Wachsausguss eines Hohldruckes angefertigte Abbildung kein gar zu verzerrtes Exemplar darstellt, so würde die Art durch ihre schmälere und schiefere Gestalt, den längeren, sich viel höher über den Schlossrand erhebenden Wirbel, das Vorhandensein eines wenn auch nur kurzen Vorderflügels, durch einen stärker abgesetzten, etwas ausgeschweiften Hinterflügel und durch schmälere, kaum an Breite zunehmende, gedrängt stehende Rippen sehr erheblich von *Av. Nordenskiöldi* abweichen.

Nathorstella semiplicata n. gen. et sp.

Taf. II, Fig. 1—4.

Von gerundet vierseitigem, nahezu geradem oder doch nur sehr wenig schiefem Umriss. Erheblich höher als breit, da ausgewachsene Individuen bei etwas 3 cm Höhe nur 2 cm Breite besitzen. Beide Klappen schwach und, wie es scheint, nahezu gleich stark gewölbt, wobei die grösste Dicke ungefähr in der Mittellinie liegt. Schlossrand gerade, nicht unbeträchtlich kürzer als die unterhalb der Mitte liegende grösste Breite der Muschel. Vorder- und Hinterrand flachbogig, Unterrand stark gebogen. Wirbel in der Nähe des Vorderrandes liegend, klein und stumpf, sich kaum über den Schlossrand erhebend.

Sehr eigenartig ist die Skulptur. Auf der flachen, flügelartig verlängerten Hinterseite liegen 10—15 ziemlich starke und breite, etwas bogenförmig verlaufende Falten, welche sich erst jenseits der Mittellinie der Muschel einstellen, hier aber gleich in voller Stärke einsetzen. Nach dem Unterrande zu werden diese Falten immer kürzer, und die letzten scheinen sich gern zu spalten. Der dem Schlossrande zunächst liegende Theil des Flügels und ebenso die ganze Vorderhälfte der Muschel sind ungerippt und nur mit feinen, aber scharfen und gedrängten, geradlinig verlaufenden Anwachsstreifen versehen. Solche sind auch auf der gefalteten Hinterseite vorhanden, wo sie indess einen welligen Verlauf haben.



Die interessante Form gehört zu den häufigeren Arten der Fauna. Namentlich in den schiefrigen Gesteinen bedeckt sie oft ganze Schichtflächen, während sie in den sandigen weit seltener zu sein scheint. Da sie offenbar ziemlich dünnschalig war, so hat sie besonders stark unter dem Gebirgsdruck zu leiden gehabt. Die meisten Exemplare sind entweder von der Seite oder in der Richtung von oben nach unten gepresst worden und haben dadurch entweder eine lange, schmale, in der Mitte kielförmig erhabene, oder eine breitgedrungene, subquadratische Gestalt angenommen. Unsere Abbildung Fig. 1 veranschaulicht an zwei neben einander liegenden Individuen diese beiden Zerrformen. Bei anderen Exemplaren, wie dem in Fig. 3 abgebildeten, hat die Zusammendrückung in diagonaler Richtung stattgefunden, und es sind dadurch Gestalten mit vom Buckel schräg nach hinten verlaufendem Kiele und *Avicula*-artigem Umriss entstanden. Während alle auf Taf. II abgebildeten Stücke Zerrformen darstellen, ist in unserem Holzschnitte der Versuch gemacht worden, die wahre Gestalt der Muschel zu rekonstruiren.

Die geringe Wölbung der Schalen, ihr gerundet vierseitiger, nur sehr wenig schiefer Umriss, der kurze Schlossrand und der kleine stumpfe Wirbel verleihen der beschriebenen Muschel ein auffälliges, an manche *Perna*-Arten erinnerndes Aussehen. Ihre Haupteigenthümlichkeit aber liegt in ihrer Skulpturirung, in der starken Berippung der Hinterseite mit den plötzlich einsetzenden Falten und der völligen Glätte der Vorderseite.

Ich kenne bei keiner anderen Muschel etwas Ähnliches. Auch Herr E. VON MARTENS in Berlin, an den ich mich unter Beifügung einer Skizze des Fossils mit der Anfrage gewandt habe, ob ihm namentlich unter den Binnen- und Brackwasserformen eine vergleichbare Muschel bekannt sei, antwortete mir, dass das nicht der Fall sei. Leider ist mir der Schlossbau der Form unbekannt geblieben; ich weiss nicht, ob sie Zähne hatte und wie das Ligament beschaffen war. Immerhin glaube ich, dass wenn die Art querstehende Ligamentgruben wie *Perna* besessen hätte, der eine oder andere Steinkern wenigstens noch eine Andeutung dieser Gruben hätte erkennen lassen. Daraus, das dies nicht der Fall ist, möchte ich schliessen, dass das Ligament, wie bei *Avicula*, über die ganze, schmale Schlossfläche vertheilt war. Nach der ganzen Gestalt des

Fossils halte ich es für wahrscheinlich, dass die Muschel zu den Aviculiden gehört. Schon der wenn auch schwach entwickelte Hinterflügel und der gerade Schlossrand legen diese Vermuthung nahe. Auf alle Fälle stellt die Form durch ihre Gestalt, ihre Skulptur und ihre, wie ich annehmen möchte, nicht-marine Lebensweise einen besonderen, sehr bemerkenswerthen Lamellibranchiatentypus dar, der es verdient durch einen eigenen Namen ausgezeichnet zu werden. Ich erlaube mir dafür die Benennung *Nathorstella* vorzuschlagen.

Myalina sp.

Taf. I, Fig. 6.

Von dieser Form liegt mir leider nur ein einziges, unvollständiges Exemplar vor — ein kleiner, auf der einen Seite stark abgetragener, doppelklappiger Steinkern, der auf der rechten Klappe noch einen Rest der ursprünglichen Kalkschale besitzt. Das Stück stammt aus den Grauwacken des Grey-Hook-Profiles.

Die Muschel war, wie es scheint, etwas ungleichklappig und von schiefer, *Gosseletia*-artiger Gestalt. Beide Klappen ziemlich stark gewölbt und auf der Vorderseite abgestutzt. Die spitzen Wirbel terminal liegend. Von jedem aus verläuft nach dem Unterrande ein markirter Kiel, der die flache Vorderseite von der gewölbten Hinterseite scheidet. Die Schale war von beträchlicher Dicke und mit Radialrippen versehen, von denen indess nur noch Andeutungen vorhanden sind.

Über die inneren Merkmale der Muschel habe ich leider keine Beobachtungen machen können. Ihre generische Bestimmung ist daher etwas zweifelhaft, wenn auch nach ihrer ganzen Gestalt die Zugehörigkeit zu *Myalina* nicht unwahrscheinlich ist. Im Devon und Carbon giebt es eine ganze Reihe von Arten, die sich zum Vergleich heranziehen liessen. Die allermeisten sind indess marin und können schon aus diesem Grunde nicht ohne weiteres mit unserer Art verglichen werden, die nach meiner Meinung in einer nichtmarinen Umgebung gelebt hat. Indess sind wenigstens einige *Myalina*-ähnliche Arten beschrieben worden, die ebenfalls in süssem oder brackischem Wasser gelebt haben, wie die von R. LUDWIG als *Dreissenia*, von SALTER als *Myalina* und von

WHEELTON HIND als *Naiadites carinata* SOW. beschriebene Form unserer westeuropäischen Steinkohlen-Schichten.[1] Diese und andere ähnliche Formen sind jedenfalls schon insofern von Interesse, als sie den Beweis liefern, dass auch in anderen Ablagerungen, deren nicht-marine Natur keinem Zweifel unterliegt, *Myalina*-artige Muscheln vorkommen.[2]

Puella? sp.

Taf. II, Fig. 5.

Auch von dieser Form befindet sich in meinem Materiale nur ein einziges, ebenfalls aus den Grauwackensandsteinen stammendes Exemplar. Die ziemlich grosse, nur im Hohldrucke vorliegende Muschel ist bei ziemlich starker und gleichmässiger Wölbung von nahezu kreisförmigen Umriss. Der kleine stumpfe Wirbel ragt nur wenig über den kurzen Schlossrand über. Es laufen von ihm zahlreiche, die ganze Oberfläche der Schale bedeckende, kräftige Radialrippen aus, die von einigen konzentrischen Anwachsringen gekreuzt werden.

Alle aufgezählten Merkmale weisen auf die in den obersilurischen und devonischen Schichten Europas und Nordamerikas nicht seltene, aber, soweit mir bekannt, nicht ins Carbon hinaufgehende Gatttung *Puella* oder *Panenka* hin. Immerhin muss die Zugehörigkeit des Fossils zu der genannten Gattung bis zur Auffindung reichlicheren und besser erhaltenen Materials zweifelhaft bleiben; und das um so mehr, als echte Puellen bisher nur aus rein marinen Ablagerungen, und zwar besonders solchen des tieferen und offneren Meeres, bekannt geworden sind. Indess wäre es auch denkbar, dass durch Verschleppung oder andere Umstände die eine oder andere Marinform in unsere, im wesentlichen wohl nicht-marine Fauna hineingerathen wäre.

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[1] WH. HIND. Monogr. on *Carbonicola*, *Anthracoptera* and *Naiadites*, Palaeontopraph. Soc. 1884, p. 138, t. 18.

[2] Auch im Donetzbecken habe ich gelegentlich der nach dem Petersburger Geologenkongresse unternommenen Reise auf der Steinkohlengrube Maximowka eine kleine *Myalina*-artige Muschel gesammelt, die dort in den pflanzenführenden Schieferthonen in Menge, wie es schien, nur in Gesellschaft von Anthracosien, ohne alle echte Marinformen auftritt.

Palæanodonta sp.

Taf. II, Fig. 7.

Sowohl in der sandigen als auch besonders in den schiefrigen Gesteinen des Grey Hook kommen vielfach kleine Muscheln von *Unio*-artige Gestalt vor. Leider sind die allermeisten stark verdrückt oder vollständig zerquetscht. Unsere Abbildung stellt ein ausnahmsweise gut erhaltenes und ungewöhnlich grosses Exemplar einer solchen Form dar. Ich glaube, dass sie zu der Gruppe der in den Steinkohlenschichten Deutschlands, Englands und anderer Länder so verbreiteten, aber auch in unseren limnischen Permablagerungen vorkommenden Zweischaler gehört, die man bisher mit dem Sammelnamen *Anthracosia* zu bezeichnen pflegte. AMALIZKY hat sich in neuerer Zeit eingehend mit diesen Formen beschäftigt und nachgewiesen, dass sie in mehrere, generisch zu trennende Typen zerfallen.[1] Für einen, der sich durch *Anodonta*-ähnliche Gestalt und den Mangel von Zähnen auszeichnet, hat er den Namen *Palæanodonta* vorgeschlagen.[2] Wie ein Vergleich der von AMALIZKY's t. 13, f. 5 der eben angeführten Arbeit abgebildeten Art mit der unsrigen erkennen lässt, ist die Übereinstimmung beider eine auffällige. Beide haben die gleiche schmale, quer ausgedehnte, hinten mit einer gerundeten Spitze endigende Gestalt, beide einen kleinen, stumpfen, stark nach vorn gerückten Wirbel. Vor allen aber scheint auch die Spitzberger Muschel zahnlos gewesen zu sein. Ich halte daher ihre Zugehörigkeit zu *Palæanodonta* für sehr wahrscheinlich; und das um so mehr, als ich auch die Spitzberger Fauna als nicht rein marin betrachten zu müssen glaube.

Palæomutela? vetusta n. sp.

Taf. II, Fig. 8.

In Begleitung der vorstehend beschriebenen *Palæanodonta* kommen in den Schiefern des Grey Hook noch andere kleine glatte Muscheln vor, die wohl nur in Folge starker Verdrückung einen sehr wechselnden Umriss zeigen. Ich war lange zweifelhaft, wo ich sie unterbringen sollte, bis es mir endlich glückte, an zweien unter ihren, die durch scheinbar dreiseitige Gestalt ausgezeichnet sind, kleine taxodonten-ähnliche Zähnchen zu beobachten. Diese beiden, mit mehreren anderen zusammen auf einer Schichtoberfläche liegenden Muscheln sind in Fig 8 in natürlicher Grösse, in Fig 8 a in etwa dreifacher Vergrösserung abgebildet. Wie man sieht, treten die etwas unregelmässig gestalteten Zähnchen **nur auf einer Seite des Wirbels**, wie ich annehme, **hinter diesem** auf. Ist diese Deutung zutreffend, so würde das links gelegene grössere Exemplar die linke, das kleinere rechts gelegene die rechte Klappe der Muschel darstellen.

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[1] Palaeontographica Bd XXXIX, 1892: Die Anthracosien der Permformation Russlands.

[2] Qu. Journ. Geol. Soc. Lond. 1895, p. 346.

Ich glaubte anfänglich, dass ich es mit einer *Nucula*-artigen Form zu thun habe; und dazu hätte ja auch der gedrungene dreiseitige Umriss der Muschel gut gepasst. Je länger ich mich aber mit ihr beschäftigte, um so zweifelhafter wurde ich in jener Auffassung. Schon die Einseitigkeit im Auftreten der Zähne (nur auf einer Seite des Wirbels), ebenso wie deren anscheinende Unregelmässigkeit machten mich stutzig. Da kamen mir die Abhandlungen AMALIZKY's über *Anthracosia*-ähnliche Muscheln des russischen und südafrikanischen Perm in die Hände,[1] worin dieser Autor eine ganze Reihe kleiner, limnischer Formen mit mehr oder weniger taxodonten-artigem Schloss bekannt macht. In der Regel sind die kleinen Zähne dieser Formen unregelmässig, von verschiedener Dicke, bogenförmig und schräg zum Schlossrande gestellt. Mitunter sind es sogar mehr Runzeln der Schlossränder als wirkliche Zähne. In anderen Fällen beobachtet man aber auch eine ziemlich regelmässige, *Nucula*-artige Zahnreihe. Sehr bemerkenswerth ist endlich, dass die Zähne häufig nur auf einer Seite des Wirbels vorhanden sind, während sie auf der anderen ganz oder fast ganz fehlen.

Nachdem mir diese interessanten Auffindungen bekannt geworden waren, ist es mir immer wahrscheinlicher geworden, dass die Spitzberger Muschel nicht zu den marinen Nuculiden, sondern in die Verwandtschaft der von AMALIZKY beschriebenen Formen gehöre. Ich möchte dies um so eher annehmen, je weniger ich an der nicht-marinen Natur der Grey-Hook-Fauna zweifeln zu dürfen glaube. Volle Sicherheit über die systematische Stellung unserer Muschel ist allerdings erst von reichlicherem und besser erhaltenem Material, als es mir jetzt vorliegt, zu erwarten.

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[1] AMALIZKY, Palaeontographica, Bd. XXXIX, 1892.
Derselbe, Qu. Journ. Geol. Soc. Lond. 1895, p. 284.
Vergl. auch NETSCHAJEW, Fauna d. perm. Ablag. d. östl. Theils d. europ. Russland. 1894, p. 252 ff.

Was nun die generische Bezeichnung unserer Art betrifft, so hat Amalizky für die Anthracosiden mit taxodonten-artigem Schlossbau zwei Typen unterschieden: 1) *Palæomutela* mit Zähnchen auf beiden Seiten des Wirbels und 2) *Oligodon* mit solchen nur hinter dem Wirbel. Darnach würde unsere Muschel als *Oligodon* bezeichnet werden können. Ich möchte aber mit Zittel[1] vorziehen beide Typen unter der Bezeichnung *Palæomutela* zusammenzufassen und führe daher die Art unter diesem Namen auf.

Ist meine Ansicht von der Zugehörigkeit der Spitzberger Form zu Amalizky's Gattung zutreffend und die Grey-Hook-Schichten wirklich devonischen Alters, so würde daraus folgen, dass *Palæomutela* erheblich älter ist, als man bisher annahm. Denn bis jetzt war die Gattung nur aus permischen Ablagerungen bekannt.

Palæomutela? sp.

Taf. II, Fig 9.

Ausser der beschriebenen Form ist in den Schiefern des Grey Hook mindestens noch eine zweite vorhanden, die ebenfalls zu *Palæomutela* gehören könnte. Sie weicht von *P. vetusta* durch lang-ovale, *Unio*-artige Gestalt ab und nähert sich dadurch dem gewöhnlichen Aussehen der Palæomutelen, unter denen dreiseitige Formen, wie *vetusta*, Ausnahmen sind.

Da ich an keinem Exemplare der in Rede stehenden Art Zähnchen beobachten konnte, so bleibt für sie die Gattungsbestimmung ganz zweifelhaft.

Lamellibranchiat. gen. et spec. indet.

Taf. II, Fig. 10.

Eine letzte, ebenfalls aus den Schiefern stammende kleine Muschel weicht von allen übrigen ab durch ihre einseitig nach hinten verlängerte schmale Gestalt mit ganz nach vorn gerücktem Wirbel. Ausser dem in Fig. 10 abgebildeten Exemplar könnte auch das auf der Platte Fig. 8 in der Nähe des Oberrandes (unmittelbar über der gerippten Aviculacee) liegende der gleichen Art angehören. Die systematische Stellung der Muschel muss unsicher bleiben.

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[1] Grundzüge d. Palaeontologie 1895, p. 284.

Gastropod. gen. et sp. indet.

Taf. I, Fig. 7.

Auch über die generische Stellung einer kleine Schnecke, die in den schiefrigen und sandigen Gesteinen des Grey Hook in Menge vorhanden ist und namentlich in den ersten oft ganze Schichtflächen bedeckt, wage ich keine bestimmte Ansicht zu äussern. Die Art — übrigens die einzige, nicht zu den Zweischalern gehörige Molluskenform der Fauna — zeichnet sich durch niedrige, aus wenigen Windungen bestehende Gestalt aus. Die Umgänge tragen 3—4 ziemlich stark vortretende, mit kleinen Knötchen gezierte Spiralkanten. Eine genauere Beschreibung ist bei der ungünstigen Erhaltung der Form leider nicht möglich.

Schlussbemerkungen.

Im Vorstehenden sind im Ganzen folgende Formen beschrieben worden.

Avicula Nordenskiöldi n. sp.
Avicula? Spitzbergensis n. sp.
Nathorstella semiplicata n. g. n. sp.
Myalina sp.
Puella? sp.
Palæanodonta sp.
Palæomutela? vetusta n. sp.
Palæomutela? sp.
Lamellibranchiat. g. et sp. indet.
Gastropod. g. et sp. indet.

Zu dieser kleinen Gesellschaft von Mollusken-Arten, deren ungenügender Erhaltungszustand in den vielen unsicher gebliebenen Gattungen und unbenannten Species deutlich zum Ausdruck gelangt, kommen, wie schon früher bemerkt, noch Trümmer von Fischknochen sowie schlecht erhaltene Landpflanzenreste hinzu.

Betrachtet man obige Liste, so muss vor Allem der völlige Mangel aller typisch marinen Thiergruppen auffallen. Es fehlt unserer Fauna jede Spur von Brachiopoden, die doch sonst nicht leicht in irgend einer palaeozoischen Marinfauna vermisst werden; und ebenso jede Spur von Cephalopoden, Trilobiten, Bryozoen, Crinoiden und anderen unzweifelhaften Meeresbewohnern.

Ist schon dieser Umstand dazu angethan, Zweifel an der marinen Natur der Grey-Hook-Schichten hervorzurufen, so müssen diese noch verstärkt werden, wenn wir die Zusammensetzung der Fauna etwas genauer ins Auge fassen. Abgesehen nämlich von einer einzigen kleinen Schnecke, sind in den Grey-Hook-Schichten lediglich Zweischaler vertreten, und auch diese nur mit einigen wenigen Arten und Gattungen. Ebenso ist aber auch die Zahl der Familien eine äusserst geringe. Sieht man nämlich von der ihrer Bestimmung nach unsicheren Gattung *Puella* ab, so scheinen sich alle Formen auf nur zwei Familien, die der Aviculiden und die der Anthracosiden, zu vertheilen. In allem dem spricht sich eine ganz auffällige Armuth und Eintönigkeit der Fauna aus. Darin aber, ebenso wie in der grossen Individuenfülle einiger wenigen Arten, liegen gerade die bezeichnenden Merkmale brackischer und limnischer Binnenfaunen gegenüber der Mannigfaltigkeit und dem Artenreichthum echter Meeresfaunen.

In dritter Linie endlich sehe ich in den Anthracosiden der Fauna einen direkten Beweis für deren nicht echt marine Beschaffenheit. Denn wir wissen schon lange, dass diese Muscheln im Steinkohlengebirge und Perm Europas und anderer Erdtheile unter Umständen auftreten, die auf eine limnische oder wenigstens brackische Bildungsweise der sie beherbergenden Schichten hinweisen.[1] Die Aviculiden unserer

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[1] Vergl. die Ausführungen über diesen Gegenstand in der oben angeführten Abhandlung von Wh. Hind, sowie in der Arbeit von Th. Ebert: Ergebnisse neuerer Tiefbohrungen im oberschlesischen Steinkohlengebirge (Abhandl. d. kgl. preuss. geol. Landesanstalt, Neue Folge, Heft 19, 1895).

Fauna können meines Erachtens nicht als Gegenbeweis gegen diese Anschauung gelten. Denn wenn auch die grosse Masse der Aviculiden zu allen Zeiten aus Meeresbewohnern bestanden hat, so scheint doch andererseits festzustehen, dass einzelne Glieder der Familie zu verschiedenen Zeiten im Brackwasser gelebt haben. So der carbonische *Aviculopecten*, der sich nach WH. HIND in Schichten findet, die zahlreiche Anthracosien, aber keine echt marine Formen einschliessen, und so noch in heutiger Zeit die Gattungen *Meleagrina* und *Perna*.[1]

Nach allem dem halte ich die Annahme einer nicht rein marinen Natur der Grey-Hook-Fauna für gerechtfertigt. Ob diese eine Brackwasser- oder gar eine Süsswasserfauna war, muss ich dahingestellt lassen. Jedenfalls würde es nach anderen Erfahrungen nicht auffallen können, wenn eine solche Fauna vereinzelte marine Formen, wie *Puella* und *Myalina*, enthielte. Die Nachbarschaft des Meeres oder auch die Abstammung der Fauna von einer früheren Meeresfauna würden diese Beimengung leicht erklären.

Es muss hervorgehoben werden, dass **die Vorstellung von einer nicht-marinen Beschaffenheit der Fauna ganz im Einklang stehen würde mit dem Old-Red-artigen Charakter der** die Grey-Hook-Schichten unterlagernden **rothen und grünen Sandsteine der Liefdebay-Formation**, wie er sich in deren Fischfauna so deutlich ausspricht. Denn das Old Red Englands und Schottlands wird von den britischen Geologen schon seit längerer Zeit als Süsswasserbildung gedeutet, und in neuester Zeit gewinnt diese Anschauung auch unter den kontinentalen Geologen immer mehr Anhänger.

Was endlich die Frage betrifft, ob und welche Anhaltspunkte die Fauna für die Altersbestimmung der Grey-Hookschichten bietet, so muss leider eingestanden werden, dass diese bisher äusserst gering sind.

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[1] *Meleagrina* ist zwar, wie Herr E. VON MARTENS in Berlin mir zu bestätigen die Güte hatte, im Allgemeinen eine halophile Form; aber an der Küste von Réunion (nahe bei Mauritius) ist sie von SANDER RANG in geringer Entfernung vom Ufer zusammen mit Aplysien, Neritinen und einer Melania unter Steinen lebend in fast ganz süssem Wasser angetroffen worden (Manuel de l'hist. natur. des mollusques, Paris 1829, p. 47). *Perna* hat Herr VON MARTENS selbst auf der Molukkeninsel Amboina in Flussmündungen in nicht salzig schmeckendem Wasser zusammen mit *Potamides* und *Neritina* lebend beobachtet.

Formen wie *Avicula Nordenskiöldi*, eine der häufigsten Arten der Grey-Hook-Schichten, und *Avicula Spitzbergensis* können in den verschiedensten Formationen vorkommen. *Nathorstella* stellt einen sonst nicht weiter bekannten Typus dar. Die Gattung *Puella* könnte als Hinweis auf Devon angesehen werden; leider aber ist ihre Bestimmung unsicher. Myalinen von ähnlicher Gestalt, wie die oben beschriebene, finden sich sowohl im Devon als auch in jüngeren Ablagerungen. Unter den Anthracosiden endlich sind Palæanodonten bisher nur im Carbon und Perm, Palæomutelen nur im Perm beobachtet.

Alles in Allem bietet daher die palaeontologische Untersuchung der kleinen Fauna kaum genügende Anhaltspunkte für ihre Altersbestimmung — übrigens eine Thatsache, die bei Annahme einer nicht rein marinen Natur der beschriebenen Fauna ziemlich erklärlich ist, da derartige Faunen viel weniger Charakteristisches zu besitzen pflegen als echt marine.

Unter diesen Umständen ist es um so erfreulicher, dass, wie in der Einleitung ausgeführt, die stratigraphischen und sonstigen geologischen Verhältnisse mit ziemlicher Sicherheit für ein devonisches Alter der Grey-Hook-Schichten sprechen. Zu Gunsten dieser Annahme fällt auch ins Gewicht, dass Fische und Pflanzenreste in diesen Schichten in ganz derselben Weise vorkommen wie in den sicher devonischen Liefdebay-Schichten.

Erklärung der Tafel I.

P.

Fig. 1—5. *Avicula Nordenskiöldi* n. sp. . . . . 9.

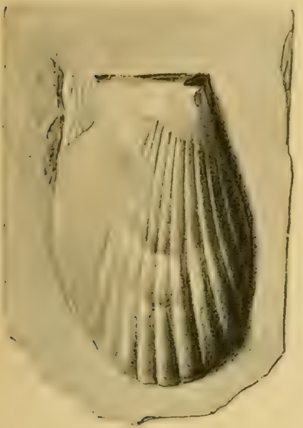
1. Steinkern der rechten Klappe, von vorn gesehen. 2. Wirbelgegend der linken Klappe in natürlicher, 2 a in etwa 2-facher Vergrösserung. 3. Steinkerne zweier neben einander liegenden Klappen. 4. Seitenansicht einer rechten Klappe. 5. Ansicht einer auf Gestein aufsitzenden linken Klappe, nach einem Wachsabguss gezeichnet.

Fig. 6. *Myalina* sp. . . . . 12.

6. Ansicht der rechten, z. Th. noch mit Kalk-Schale versehenen Klappe eines doppelklappigen Steinkernes. 6 a derselbe Kern in der Vorderansicht.

Fig. 7. Gastropod. g. et. sp. indet. . . . . 17.

Ansicht eines Exemplares in ungefähr 3-facher Vergrösserung.



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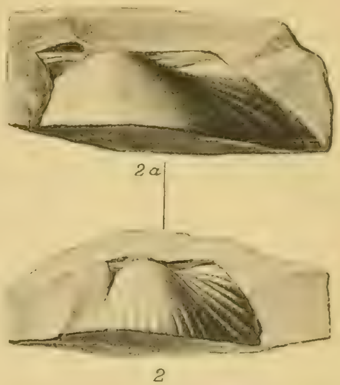

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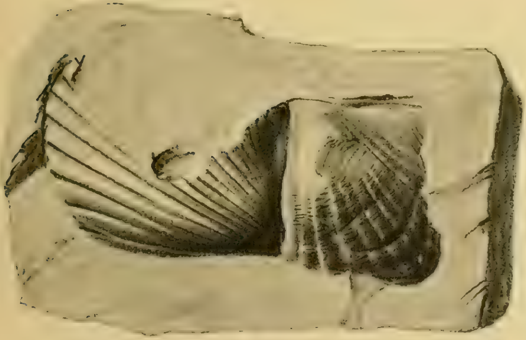

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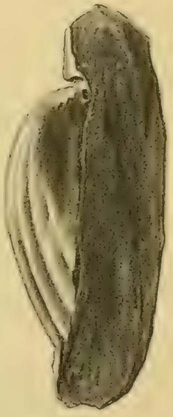

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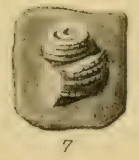

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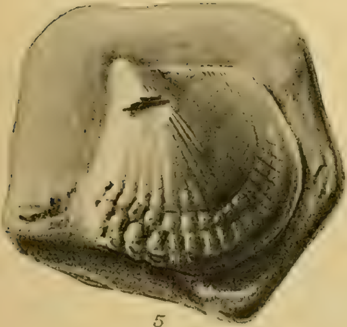

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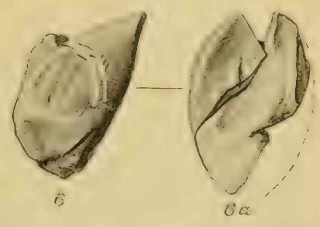

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D:r E. Beyer del.

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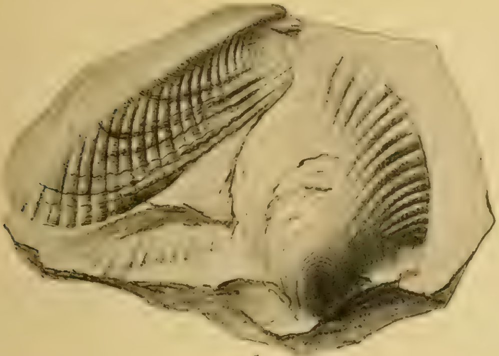
Erklärung der Tafel II.

		P.
Fig. 1—4.	*Nathorstella semiplicata* n. gen. et sp. . . . . . 1. Platte mit zwei neben einander liegenden Klappen, deren eine (eine rechte) in der Richtung der Mittellinie, die andere (linke) senkrecht dazu verdrückt ist. 2. Ansicht einer rechten, ebenfalls stark verzerrten Klappe. 3. Wachsausguss einer linken, in diagonaler Richtung verzogenen Klappe. 4. Wachsausguss einer linken, in der Richtung der Mittellinie verkürzten Klappe.	10.
Fig. 5.	*Puella?* sp. Ansicht einer einzelnen, nach dem Wachsausguss eines Hohldruckes gezeichneten Klappe.	13.
Fig. 6.	*Avicula? Spitzbergensis* n. sp. . . . . Auf Gestein aufsitzende linke Klappe, nach dem Ausguss eines Hohldruckes gezeichnet.	9.
Fig. 7.	*Palæanodonta* sp. . . . . Ausguss des Hohldruckes einer isolirten rechten Klappe.	14.
Fig. 8.	Platte mit mehreren darauf liegenden Muscheln. Unweit des Oberrandes (links über der gerippten *Avicula*) zwei Exemplare von *Palæomutela? vetusta* n. sp. . . . . 8 a Dieselben beiden Exemplare in 3-facher Vergrösserung.	14.
Fig. 9.	*Palæomutela?* sp.	16.
Fig. 10.	Lamellibranchiat. g. et sp. indet.	16.



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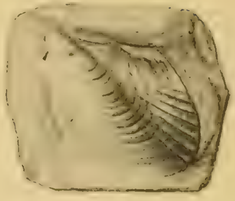

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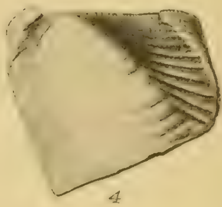

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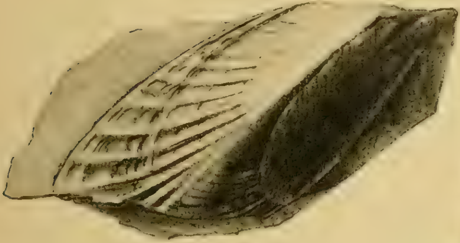

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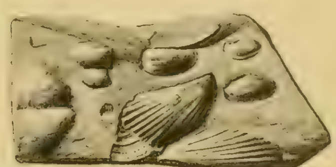

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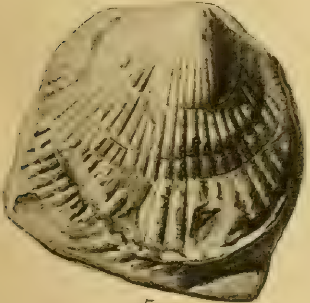

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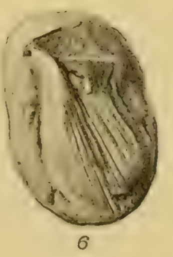

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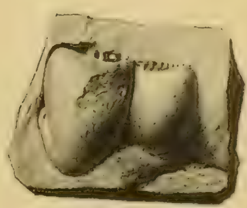

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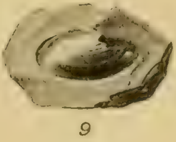

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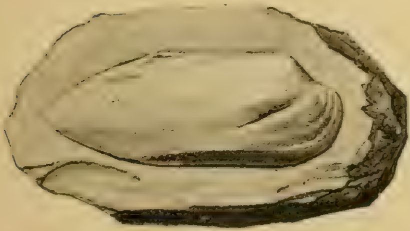

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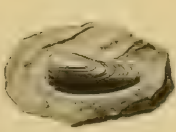

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D:r E. Beyer del.

Ljustryck af Chr. Westphal, Stockholm

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 3.

Beiträge zur Kenntniss der Insektenfauna von Kamerun

N:o 8

LOCUSTODEEN AUS KAMERUN
UND
KONGO

VON

DR. YNGVE SJÖSTEDT

MIT 4 TAFELN

MITGETEILT AM 13. FEBRUAR 1901
GEPRÜFT VON HJALMAR THÉEL UND CHR. AURIVILLIUS

STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1901

Obschon Kameruns Locustodenfauna lange* der Gegenstand eingehender Studien gewesen ist, scheint sie doch noch recht unvollständig bekannt zu sein, noch viel Neues darzubieten zu haben. Die von mir während einer Reise in den nordwestlichen Teilen des Landes 1890—92 zusammengebrachte, aus 37 Arten bestehende Locustodensammlung enthält, wie aus folgender Uebersicht hervorgeht, auch mehrere neue, mehrere wenig bekannte Formen. In dieser Uebersicht finden sich auch eine Anzahl Formen angeführt, die dem Reichsmuseum bei verschiedenen Gelegenheiten von Landsleuten — den Herren Knutson, Valdau, Löfdal, Lindow, Dannfelt und Theorin — überliefert worden sind. Im Ganzen umfasst dieselbe 47 Arten, von denen 16 neu sind. Von diesen gehören 8, nämlich *Arantia melanotus*, *Bongcia puncticollis*, *Itokiia silvarum*, *Poreuomena forcipata*, *Mangomaloba*

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* F. Karsch, Orthopterologische Beiträge, III, in: Berl. Ent. Zeitschr. XXXII, 1888, p. 415, 437, 447, 457, 460.

» » Orthopterologische Mittheilungen, in: Ent. Nachr. XVI, 1890, p. 60—62.

» » Neue westafrikanische, durch Herrn Premierlieutenant Morgen von Kribi eingesandte Orthopteren, in: Ent. Nachr. XVI, 1890, p. 258—270.

» » Verzeichniss der von Herrn Dr Paul Preuss auf der Barombi-Station in Deutsch-Westafrika 1890 gesammelten Locustodeen aus den Familien der Phaneropteriden, Mekopodiden med Gryllakriden, in: Ent. Nachr. XVI, 1890, p. 353—369.

» Orthopterologische Beiträge IV, in: Berl. Ent. Zeitschr. XXXVI, 1891, p. 71—114.

» » Uebersicht der von Herrn Dr Paul Preuss auf der Barombi-Station in Kamerun gesammelten Locustodeen, in: Berl. Ent. Zeitschr. XXXVI, 1891, p. 317—341.

» » Verzeichniss der von Herrn Dr Paul Preuss im Kamerungebirge erbeuteten Orthopteren, in: Berl. Ent. Zeitschr. XXXVII, 1892, p. 73—78.

» » Locustodeen von Victoria in Kamerun, gesammelt von Herrn Dr Paul Preuss, in: Ent. Nachr. XIX, 1893, p. 195—199.

» » Neue Orthopteren aus dem tropischen Afrika, in: Stett. Ent. Zeit. LVII, 1896, p. 326—352.

monticola, *Miltinobates blandus*, *Dannfeltia nana* und *Eurycorypha montana* zu den **Phaneropteridæ**, *Coryeus siccifolium* zu den **Mecopodidæ**, 6, nämlich *Mustius superbus*, *Pleminia personata*, *Lichenochrus marmoratus*, *L. maculosus*, *L. flavifrons* und *Orchestridoptera rufipes* zu den **Pseudophyllidæ** und *Cosmoderus femoralis* zu den **Hetrodidæ**.

Die innerhalb des Gebietes allgemeinsten Arten sind die in lichtem Buschwalde zwischen dem niedrigen Laubwerke lebende *Zeuneria melanopeza*, die auf offenem Terrain im Grase vorkommende *Phaneroptera nana* und der *Conocephalus mandibularis*, die sich im dunklen, feuchten Buschwalde zwischen herabgefallenem faulendem Laube aufhaltenden *Apteroscirtus denudatus* und *Leproscirtus granulosus* sowie auch der *Macroscirtus preussianus* und die *Anoedopoda lamellata* nebst dem auf Blättern und Zweigen langsam umherkriechenden *Cosmoderus femoralis*.

Alle Fundorte, wo Kongo nicht genannt ist, sind in Kamerun belegen.

Die Sammlung gehört dem Reichsmuseum zu Stockholm.

Fam. Phaneropteridæ.

Brunner von Wattenwyl, Monographie der Phaneropteriden, herausgegeb. von d. K. K. zool. bot. Ges. Wien, 1878, p. 1—401, Taf. I—VIII; Addimenta zur Monogr. Phaneropt. aus den Verhandl. der K. K. zool. bot. Ges. Wien, Jahrg. 1891, p. 1—196, Taf. 1—11.

Gruppe der Karschiæ.

Stenamblyphyllum dilutum Karsch.

Stenamblyphyllum dilutum Karsch, Stett. Ent. Zeitung LVII, 1896, p. 327, Fig. 39, ♀.

Von dieser a. a. O. nach ♀-Exemplaren beschriebenen schönen Art liegt ein von Bonge mitgebrachtes ♂, und zwar von folgendem Aussehen vor: Kopf, Thorax und Hinterleib blassgelb oder blassgrün, der letztere oben längs der Mitte mit einem breiten, annelinroten Band; der Vorderrand des Pronotums in der Mitte, ein winkeliger Eindruck des Pronotums oben, eine Fortsetzung der hinteren Rinne der Seitenlappen bildend, und der Hinterrand des dorsalen Hinterlappens schwarzbraun; Beine blass gelblich mit oben dunkel rotbräunlichen Schienen und rotbräunlichem unteren Teil der Schenkel, welche im Übrigen mit rötlichen Pünktchen bestreut sind; alle Schenkel an der Spitze jederseits mit 2 Dörnchen und die der zwei vorderen Beinpaare am Unterrand mit einem oder mehreren kleinen Stacheln; das dicke Basalglied der Fühler gelb mit einem unvollständigen, schwarzbraunen Ring in der Mitte; Fühler im Übrigen schwarzbraun, fein dicht und kurz behaart und mit einigen kleinen hellen Ringen; Deckflügel fast gleichmässig schmal, gegen die Basis etwas breiter; Speculum schwarzbraun und in der Mitte etwas durchsichtig; vor und hinter demselben ein grosser, brauner Fleck, durch die grünen Ulnaradern in mehrere geteilt; Mediastinalader vorhanden;

das basale Siebentel der vorderen Radialader verdickt, blassgrün; das sich nach aussen stark verschmälernde Mediastinalfeld mit gefurchten, schräg gestellten, nach aussen kurzen, geraden, querüber gestellten Zweigen; Radial- und Ulnarfeld stark erhaben netzartig, fein und dicht braun punktiert; vordere und hintere Ulnarader weit von einander getrennt; zwischen der ersteren und der hinteren Radialader eine Menge winkelrecht stehende Queradern; Ulnarfeld von 5—6 schrägen Zweigen durchsetzt; Cerci grün, 2 mm. lang, drehrund, lang behaart, einwärts gebogen, nach aussen verjüngt, mit kurzer, brauner, schräg nach oben gerichteter Spitze; Subgenitalplatte etwa in der Mitte in einem abgerundeten, stumpfen Winkel gebogen; der äussere Teil viel schmäler, grün, bis an die Mitte geteilt; die Hinterflügel die Deckflügel um 3 mm. überragend.

Länge des Pronotums	5	mm
» der Deckflügel	37	»
Breite » »	3,8	»
Länge » Hinterflügel	39	»
» » Vorderschenkel	13	»
» » Vorderschienen	14,6	»
» » Hinterschenkel	29	»
» » Hinterschienen	36,5	»
» » Cerci	2	

Fundort: Bonge, 10. Dec. 1891, ♂.

Gruppe der Arantiæ.

Gen. **Arantia** Stål.

Stål, Rec. orth. II, 1874, p. 10; Brunner, Monogr. Phaneropt. p. 136; Addim. Monogr. Phaneropt., p. 63; Karsch, Ent. Nachr. XVI, 1890, p. 355; Berl. Ent. Zeitschr. XXXII, 1888, p. 432; XXXVI, 1891, p. 318; XXXVIII, 1893, p. 126; Stett. Ent. Zeitung LVII, 1896, p. 331.

Arantia melanotus Sjöst. n. sp.

Taf. II, Fig. 1; Taf. IV, Fig. 4.

♂: Grün mit hyalinen Flügeln, schwarzen, ziemlich grossen Gehörorganen der Vorderschienen, glänzend schwarzen Zeichnungen an der Basis der Deckflügel, abgeplattetem, glänzendem Hinterteil des Pronotums, an der Spitze gefurchten und dort mit einem Zahn versehenen Cerci und schwarzen Stacheln am Unterrand der Hinterschenkel. Scheitelgipfel etwas lamellenartig zusammengedrückt, oben tief gefurcht, den Stirngipfel nicht berührend; Pronotum von oben gesehen ziemlich schmal, nach hinten wenig breiter; Seitenlappen gerundet angesetzt, gross, so lang wie hoch; der hintere dorsale Teil des Pronotums flach, glänzend, das Pronotum im Übrigen, wie der Kopf, matt; diese Partie oval, vorn schwächer gebogen und an den Seiten von einem dunklen, schmalen Fleck begrenzt; etwas vor derselben ein winkeliger, hinten von zwei abgerundeten Wällen begrenzter Eindruck; die zwei Rinnen der Seitenlappen ziemlich seicht; Unterrand der Seitenlappen fast gerade, etwas schräg; Voderwinkel stumpf, abgerundet; Hinterwinkel breit abgerundet; Schulterbucht breit und tief, oben etwas dunkel umsäumt; Form und Aderung der Flügel aus der Zeichnung zu ersehen; Deckflügel an der Basis glänzend schwarz; ein glänzend schwarzer Fleck auch am Mesonotum; Vorderschenkel an der Spitze jederseits mit zwei, unten am Innerand mit 5—6 Stacheln; Gehörorgan der Vorderschienen schwarz, vorn muschelförmig, hinten breit offen; Vorderschienen vorn tief gefurcht, Innenrand, mit Ausnahme an der Spitze, ohne Stacheln, Aussenrand mit 4—6 Stacheln, von denen der erste am Gehörorgan sitzt; Hinterschenkel an der Spitze jederseits mit 2, unten am Aussen- und Innenrand mit 4—6 ziemlich grossen, schwarzen Stacheln; Hinterschienen deutlich gebogen, oben mit zahlreichen, unten mit vereinzelten, gegen die Spitze dichter stehenden Stacheln; die Subgenitalplatte in zwei abgerundet trianguläre, behaarte, ziemlich kurze Processe auslaufend. Cerci an der Spitze gefurcht, der eine Zweig derselben einen etwas gebogenen schwarzen Zahn bildend.

Länge des Pronotums	8 mm
» der Deckflügel	50 »
» » Vorderschenkel mit Trochanter	11 »
» » Vorderschienen	13 »
» » Hinterschenkel	38
» » Hinterschienen	45 »
» » Cerci	4

Fundort: Bonge, 25. Nov. 1891, ♂.

Arantia orthocnemis KARSCH.

Arantia orthocnemis KARSCH, Ent. Nachr. XVI, 1890, p. 357.

Fundort: Ein mit der angeführten Beschreibung übereinstimmendes ♂ von Itoki, am 9. Jan. 1891 genommen.

Arantia latifolia KARSCH.

Arantia latifolia KARSCH, Ent. Nachr. XVI, 1890, p. 356.

	♀	
Länge des Pronotums	7 — 7,5	mm
» der Deckflügel	44 —45	»
Breite » »	16,5—17	»
Länge » Vorderschenkel	11	»
» » Vorderschienen	12 —12.3	»
» » Hinterschenkel ohne Trochanter	31	»
» » Hinterschienen	37 —38	»

Fundorte: Zwei ♀, das eine bei Itoki, 6. Jan. und das andere bei N'dian, 1. Juni 1891 genommen.

Gruppe der Phlaurocentra.

Goëtia galbana KARSCH.

Goëtia galbana KARSCH, Berl. Ent. Zeitschr. XXXVI, 1891, p. 323, Fig. 2 (♀).

Diese ausgezeichnete Gattung scheint sich an die Gruppe der *Phlaurocentra* (BRUNNER, Addim. Monogr. Phaneropt. p. 10) am nächsten anzureihen.

	♂	♀	
Länge des Körpers mit dem Kopf	35	35 —40	mm
» der Deckflügel	52	55 —60	»
Breite » »	14	16 —17	»
Länge » Vorderschienen	11	11 —12	»
» » Hinterschenkel	28	33 —34	»
» des Pronotums	7	7,5— 8	»
der Legescheide		5 — 6	»

Fundorte: Wewoka, Juni 1891 ♀; Bonge, 9. Nov. ♀, 3. Dec. ♂; Kamerun ♀.

Gruppe der Psyræ.

Gen. **Bongeia** Sjöst. n. g.

Caput magnum, glabrum, oculis globosis parvis, fastigio verticis alto, convexo, antice paululo applanato, cum fastigio frontis contiguo, spatio inter antennas latiore quam oculis, medio sulcato; pronotum disco plano, paulo excavato, dense impresso-punctatum, antice sinuatum, postice curvatum, lobis deflexis, angulo acuto insertis, subæque altis et longis, margine infero et postico rotundatis, sinu humerali distincto, margine antico recto; elytra perangusta, venis radialibus contiguis, margine antico et postico parallelis, apice rotundato, venulis dense reticulato-prominulis, ramo anteriore venæ radialis posterioris post medium emisso, venis radialibus curvatis; coxæ anticæ spina armatæ; tibiæ anticæ in latere antico foramine conchato, in latere postico foramine aperto instructæ; femora omnia spinis instructa; ovipositor ♀ pronoto longior, marginibus apicem versus crenulatis, compressus, sensim incurvus, apice sensim acuminatus, plica basali rotunde tumescente.

Scheint der Gattung *Tapeina* Brunner (Add. Monogr. Phaneropt. p. 12 u. 74) am nächsten zu stehen.

Bongeia puncticollis Sjöst. n. sp.

Taf. IV, Fig. 3 a, 3 b.

♀: Grün, Kopf gross, von vorn gesehen oval mit ziemlich hohem, abgerundetem, nach vorn ganz wenig abgepattetem Scheitel; der ganze Kopf völlig glatt, das Pronotum dagegen überall dicht eingedrückt punktiert und mit scharf rechtwinkelig angesetzten Seitenlappen, von oben gesehen rektangulär mit etwas eingebuchtetem Vorderrand und gebogenem Hinterrand; in der Mitte ein triangulärer, glatter Eindruck; Vorderschenkel unten am Innenrand mit 4—5 Dörnchen; Vorderschienen oben ungefurcht, unten jederseits mit 6—7 Stacheln; Mittelschenkel unten am Innenrand mit 1—2 Dörnchen; Mittelschienen unten am Innenrand mit 7—8, am Aussenrand mit 6—7 Stacheln; Hinterschienen unten am Aussenrand mit 6, am Innenrand mit 2 Stacheln; Legescheide nur an der Spitze schwach bräunlich angehaucht, ihre Oberfläche dicht eingedrückt punktiert; die Spitzenloben der Hinterschenkel ohne Stacheln.

Länge des Pronotums	5,5	mm
» der Deckflügel	4	»
» » Vorderschenkel	6,5	»
» » Hinterschenkel	16	»
» » Vorderschienen	8	»
» » Hinterschienen	19	»
» » Legescheide	8	»

Fundort: Kamerun, ♀.

Gen. **Itokiia** Sjöst. n. g.

Generi præcedenti valde affine sed forma alia capitis distinguendum.

Caput modicum, glabrum, fastigio verticis applanato, antice angustiore et profunde laminato-sulcato, cum fastigio frontis contiguo, paulo humiliore quam oculis, spatio inter antennas angustiore quam oculis; pronotum dense impresso-punctatum, antice sinuatum, postice curvatum, lobis deflexis angulo acuto insertis, lobis laterialibus paulo altioribus quam longis, margine infero et postico rotundatis, sinu humerali distincto, margine antico recto; elytra et pedes ut in genere præcedente; speculum non vitreum; lamina subgenitalis ♂ fissa, stylis liberis instructa; cerci longi, sensim curvati, apice dente vix conspicuo instructi.

Itokiia silvarum Sjöst. n. sp.

♂: Grün, Kopf oben flach, etwas niedrieger als die Augen, nach vorn mit einer von zwei Lamellen gebildeten deutlichen Rinne; Vorderschenkel aussen am Innenrand mit 2 sehr kleinen Dornen; Vorderschienen schmal mit grossem Gehörorgan, oben nur an der Spitze am Aussenrand mit 1 Dorn, unten mit 6 Paar Dornen; Hinterschenkel am Aussenrand mit 5—7, am Innenrand mit 3—5 Dornen.

Länge des Pronotums	4	mm
Breite » »	3	»
Länge der Deckflügel	29	»
Breite » »	7,2	»

Länge der Vorderschenkel	5,3	mm
» » Vorderschienen	5,4	
» » Hinterschenkel	12,3	
» Hinterschienen	14,8	»
» » Cerci	2,5	

Fundort: Itoki, Jan. 1891, ♂.

Dapanera genuteres KARSCH.

Taf. IV, Fig. 1 a, 1 b.

Dapanera genuteres KARSCH, Berl. Ent. Zeitschr. XXXII, 1888, p. 441; BRUNNER VON WATTENWYL, Addim. Monogr. Phaneropt. 1891, p. 75.

Von dieser Art, von welcher bisher nur das von der Goldküste beschriebene ♂, die Type der Gattung, bekannt war, liegt ein aus Kongo erhaltenes männliches Exemplar vor. Mit diesem stimm tein aus Kamerun heimgebrachtes ♀ in allen plastischen Charakteren so vollständig übereins, dass, obschon dasselbe bedeutend grösser ist, kein Zweifel über die Zusammenhörigkeit dieser Exemplare herrschen kann. Das ♀ ist hellgrün; die Beine zind bei ihm, wie beim ♂, mit deutlichen kurzen, weissen Haaren besetzt; die Vorderschenkel haben unten am Innenrand 4—5 Stachel; die Vorderschienen sind oben glatt und nur an der Spitze mit einem am Aussenrand sitzenden kleinen Stachel versehen; unten haben sie am Aussenrand 3, am Innenrand 4—5 Stachel, von denen das letzte Paar an der Spitze sitzt; die Mittelschenkel haben am Innenrand 3—4, am Aussenrand und an der Spitze keine Stachel; die Mittelschienen sind oben, wie die Vorderschienen, glatt und nur an der Spitze mit einem am Aussenrand sitzenden Stachel versehen; unten haben sie am Innenrand 6—8, am Aussenrand 4—5 Stachel; die Hinterschenkel haben abgerundete, glatte Spitzenloben und unten am Aussenrand 8, am Innenrand 3—7 Stachel; die Hinterschienen sind gerade; die Legescheide ist nach aussen nicht besonders stark verjüngt, an der Spitze ist sie breit abgerundet, ihr Oberrand ist fast gerade und seine äusseren $^2/_3$ sind stark creneliert; ihr Unterrand ist an der Basis gebogen, weshalb die Legescheide hier etwas tiefer erscheint, und nur an der Spitze creneliert ist; ihre Oberfläche ist dicht eingedrückt punktiert und an der angeschwollenen Basis glatt.

	♂	♀	
Länge des Pronotums	6	7,5	mm
» der Deckflügel	32	46	»
Breite » »	10	13,5	»
Länge » Vorderschenkel mit Trochanter	6	7,5	»
» » Vorderschienen	6	7,5	»
» » Hinterschenkel	20	23	»
» » Hinterschienen	20	24	»
» » Legescheide		8	»

Fundorte: Itoki, 4. Febr. 1891, (SJÖST.) ♀; Kongo (DANNFELT) ♂.

Gruppe der Poreuomenæ.

Gen. **Poreuomena** BRUNNER.

BRUNNER VON WATTENWYL, Monogr. Phaneropt. 1878, p. 187; Addim. Monogr. Phaneropt., 1891, p. 13.

Poreuomena forcipata SJÖST. n. sp.

Taf. II, Fig. 3, 4.

♂: Grün mit nach oben schwarz umsäumtem Tympanalfeld, fein dunkel punktiertem Innenrand der Deckflügel und schwarzen, an der Basis hellen Fühlern; Beine lang und schmal; Vorderschenkel* unten mit 7 sehr kleinen, niedrigen, am Innenrand stehenden Dornen; Mittelschenkel am Innenrand mit 6—9, Hinterschenkel unten nach der Spitze hin jederseits mit 1—2 Dornen; Vorderschienen am Innenrand mit 4, am Aussenrand mit 3, Mittelschienen mit resp. 8—11 und 6 Dornen; Cerci kräftig und aufwärts gebogen, am 2. Drittel mit einem vom Innenrand ausgehenden grossen, zurückgebogenen Haken; Subgenitalplatte ziemlich klein, gespalten, ohne Griffel an der Spitze; Analsegment ohne Loben, triangulär, herabgebogen und angewachsen und längs der Mitte vertieft.

Länge des Pronotums	5	mm
Breite » »	3	»
Länge der Deckflügel	33	»
Breite » »	6	»

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* Schenkel und Schienen des rechten Vorderbeines bei dem vorliegenden Exemplar ohne Dornen.

Länge der Vorderschenkel	7	mm
» » Vorderschienen	7	»
» » Mittelschenkel	10	»
» » Mittelschienen	9,3	»
» » Hinterschenkel	21	»
» » Hinterschienen	24	»
» » Cerci	5	»

Fundort: Kamerun.

Obgleich diese ausgezeichnete Art ein verschieden geformtes triangulares, nicht gespaltenes Analfeld besitzt, habe ich sie zu der Gattung *Poreuomena* gezählt, mit der sie im Übrigen in allen wichtigen Charakteren übereinstimmt. Sollte sich auch das noch unbekannte ♀ von dem ♀ der genannten Gattung unterscheiden, ist eine neue Gattung aufzustellen.

Poreuomena africana Brunner.

Poreuomena africana Brunner, Monogr. Phaneropt. 1878, p. 187, Fig. 53 (♂); Karsch, Ent. Nachr. XVI, 1890, p. 262 (♂ ♀).

Von Bonge liegt ein ♀ einer *Poreuomena*-Art vor, das ohne Zweifel *P. africana* angehört und mit dem von Karsch a. a. O. beschriebenen ♀ aus Kribi identisch ist. Wie dieses, hat es den Ursprung des Radialaderastes näher der Mitte, als Brunner für das ♂ dieser Art angiebt, und, wie Karsch o. c. S. 363 betont, die Schenkel aller Beine unten gedörnelt. An den Schenkeln der zwei ersten Beinpaare sind die Stachel freilich klein, an den Hinterschenkeln dagegen ziemlich gross. An den Schenkeln der zwei ersten Beinpaare sitzen, am Innenrand gegen die Spitze hin, 4 Stachel; Vorderschienen unten mit 3 Paar, Mittelschienen mit 5 Paar Dornen; an den Hinterschenkeln am Innenrand 1 und am Aussenrand 2 gegen die Spitze hin sitzende Dornen; Vorder- und Mittelschienen oben ungefurcht. Wie die zu derselben Gruppe gehörende *Zeuneria melanopeza* hat auch diese Art die Tarsen und die Spitzen der Schienen dunkler, aber nicht schwarz, sondern dunkelgrün gefärbt.

Länge des Pronotums	4,5	mm
» der Deckflügel	27	»
Breite » »	5	»

Länge der Vorderschenkel	6	mm
» » Vorderschienen	7	»
» Hinterschenkel	20	»
» » Hinterschienen	22	»
» » Legescheide	6	»

Fundort: Bonge, 10. Dec. 1891, ♀.

Gen. **Mangomaloba** Sjöst. n. g.

Caput parvum; fastigium verticis antice acuminatum, sulcatum, cum fastigio frontis non contiguum; oculi magni, globosi; margines scrobum antennarum elevati, fastigium frontis valde superantes; distantia inter antennas angustior longitudine articuli magni basalis antennarum; pronotum disco plano, lobis deflexis rotundatim insertis, sinu humerali distincto; meso- et metasternum medio triangularia, lateribus elevatis, non in lobos productis; elytra angusta, basin versus paulo latiora, margine antico et postico subparallelis, venulis transversis elevato-prominulis, parallelis confertis; vena mediastina basi distincta; venæ radiales spatio angustissimo, pellucido disjunctæ, vena antica impressa, plicam longitudinalem formans; ramus radialis primus circiter in tertia parte basali oriens, post medium furcatus, secundus simplex, prope apicem elytri oriens; speculum hyalinum; femora omnia spinulis armata; tibiæ anticæ et intermediæ supra paulo sulcatæ et totæ inermes, illæ antice foramine conchato, postice foramine aperto instructæ; coxæ anticæ spina armatæ; lamina subgenitalis curvata, profunde fissa, stylis nullis; segmentum anale triangulari, in lobos non productum; cerci fere recti, apice subito in dentem brevem angulatim producti.

Diese der Gruppe der *Poreuomenæ* angehörende Gattung steht *Cestromoecha* Karsch (Berl. Ent. Zeitschr. XXXVIII, 1893, p. 128) und *Poreuomena* Brunner (Monogr. Phaneropt. p. 187) sehr nahe, unterscheidet sich von ihnen aber leicht durch die Form des Analsegmentes, der Cerci und der Subgenitalplatte sowie auch durch das Vorhandensein eines hyalinen Speculums. Von *Poreuomena* unterscheidet sie sich ferner durch die oben fein gefurchten Vorder- und Mittelschienen.

Mangomaloba monticola Sjöst. n. sp.

Taf. III, Fig. 4.

♂: Grün mit feinen, dunklen Pünktchen am Innenrand der Deckflügel und dunklem, linkem Tympanalfeld; Schenkel der zwei ersten Beinpaare unten aussen am Innenrand mit 3–5 sehr kleinen Dornen; Vorderschienen unten am Innenrand mit 4, am Aussenrand mit 3 Dornen; Mittelschienen an der Spitze unten mit 6—7 Paar dicht sitzenden Dornen, oben nach unten am Innenrand mit 3, am Aussenrand mit 1 Dorn; Hinterschenkel gegen die Spitze hin unten am Innenrand mit 2, am Aussenrand mit 3 Dornen; Cerci ziemlich dick, nach aussen wenig verengt, gerade, an der Spitze mit einem kleinen, in einem geraden Winkel gebogenen Dorn; Subgenitalplatte ziemlich tief gespalten.

Länge des Pronotums	4,7	mm
Breite » »	3	»
Länge der Deckflügel	27	»
Grösste Breite der Deckflügel	5	»
Länge der Vorderschenkel	6	»
» » Vorderschienen	7	»
» » Mittelschenkel	8,3	»
» » Mittelschienen	9,3	»
» » Hinterschenkel	19	»
» » Hinterschienen	22	»
» » Cerci	2,8	»

Fundort: Kamerungebirge (Knutson & Valdau 1884—85) ♂.

Gen. **Miltinobates** Sjöst. n. g.

Vertex planiusculus, antice acuminatus, sulcatus, cum fastigio frontis non contiguus; margines scrobum antennarum elevati, fastigium frontis valde superantes; oculi globosi; pronotum disco plano, medio impressione triangulari instructum, margine antico recto, postico curvato, lobis deflexis rotumdatim insertis, longioribus quam altis, lineis duabus impressis parallelis instructis, margine antico paulo incurvato, inferiore recto, postico ad medium angulato-rotundato curvato, sinu humerali lato; pedes longi, graciles; tibiæ anticæ pronoto, elytra tibiis intermediis duplo longiores; tibiæ anticæ in

latere postico foramine aperto, in latere antico foramine conchato instructæ; coxæ anticæ (defectæ) spina instructæ (?); tibiæ anticæ et intermediæ supra sulcatæ et apice inermes, posticæ supra apice spinis duabus curvatis instructæ; femora antica subtus margine inferiore spinulis armata, intermedia et postica tota inermia, omnia apice utrimque spina armata; tibiæ omnes armatæ; elytra margine antico curvato, postico recto, venis radialibus totis disjunctis, vena antica paulo impressa, plicam longitudinalem formante, venulis transversis elevato-prominulis, subparallelis; cerci teretes, longi, recurvi; lamina subgenitalis ♂ elongata, basi lata, deinde valde attenuata, profunde fissa; segmentum anale ♂ margine postico inciso, lobis latis, rotundatis.

Miltinobates blandus Sjöst. n. sp.

Taf. IV, Fig. 2.

Das ganze Tier rotbraun, Kopf und Beine glänzend, Deckflügel, Scheitel und Pronotum matt, ein wenig ins Violette übergehend; Randfeld der Deckflügel, mit Ausnahme der Adern, heller; Fühler fein, schwarz, gegen die Basis hin etwas bräunlich; Flügel hyalin mit rotbrauner Aderung; Vorderschenkel am Innenrand mit einigen äusserst kleinen, an dem einen Bein kaum zu entdeckenden Dörnchen; Vorderschienen oben am Aussenrand mit zwei Dornen, der erste gleich unter dem Gehörorgan, und unten am Aussen- und Innenrand mit 3—5 Dornen; Mittelschienen oben und unten am Aussen- und Innenrand gedörnelt:

Länge des Pronotums	5,5	mm
» der Deckflügel	29	»
Breite » »	8,8	»
Länge der Vorderschenkel	12	»
» » Vorderschienen	12	»
» » Mittelschenkel	13	»
» » Mittelschienen	14,5	»
» » Hinterschenkel	24	»
» » Hinterschienen	30	»
» » Cerci	6	»
» » Subgenitalplatte	8	»

Fundort: Kongo (Dannfelt).

Zeuneria melanopeza KARSCH.

Zeuneria melanopeza KARSCH, Berl. Ent. Zeitschr. XXXII, 1888, p. 443 (♀); BRUNNER, Verh. K. K. zool.bot. Ges. Wien, XLI, 1891, p. 94 (♂ ♀), Taf. I, Fig. 13 a, 13 b, (♂).

In lichtem Buschwalde zwischen dem niedrigen Blattverk wurde diese Art allgemein angetroffen. Bewegt sich nicht besonders schnell und fliegt nur kurze Strecken.

Fundorte: Itoki, 12. Jan. 1891, ♂, 21. Febr. ♂; Kitta, 13. April, ♂; N'dian, 11. Juni, ♂; Bonge, 17. Sept. ♂, 7. Dec. ♂; Kamerun, ohne nähere Angaben 3 ♂, 2 ♀. Kongo, ♂ (DANNFELT).

Gravenreuthia saturata KARSCH.

Taf. III, Fig. 1.

Gravenreuthia saturata KARSCH, Berl. Ent. Zeitschr. XXXVII, 1892, p. 74, Fig. 2, ♂.

Gelbgrün oder grün mit hyalinen Hinterflügeln und hellbräunlichem, braun punktiertem, schmalem äusserem Teil des Tympanalfeldes; Augen hellbraun, halbkugelförmig vorspringend; Gehörorgan der Vorderschienen bräunlich angehaucht; Fühler rotbräunlich, die verdickten Basalglieder gelblich; Pronotum von der halben Länge der Vorderschenkel ohne Hüften, oben flach, deutlich konkav, vorn etvas eingebuchtet und dort an den Seiten winkelig herabgebogen; Seitenlappen vorn deutlich eingebuchtet, aber nicht so tief wie an der Schulterbucht; Seitenlappen im Übrigen rundlich angesetzt, nach hinten höher, Vorder- und Hinterwinkel breit abgerundet, Unterrand nur wenig gebogen; der hintere dorsale Teil des Pronotums nach vorn von einer abgerundeten, schwach gebogenen Rinne begrenzt, von oben gesehen quer-rektangulär, nach vorn verengt, mit gebogenem, schwarzem Hinterrand; Seitenlappen mit zwei parallelen, fast geraden, ziemlich tiefen Rinnen; Vorderschenkel an der Spitze jederseits mit einer kleinen, mit zwei Stächelchen versehenen Lobe, von denen das untere kleiner ist; der untere, innere Rand der Vorderschenkel mit 5—8 sehr kleinen Stacheln, Vorderschenkel im Übrigen glatt; Vorderschienen oben ausgehöhlt, am Aussenrand mit 2—4 Stacheln, von denen der erste am Gehörorgan sitzt, an der Spitze jederseits mit einem Stachel, am Innenrand glatt, unten am Aussen- und Innenrand mit 10—11 Stacheln; Schenkel des zweiten Beinpaares an der Spitze jederseits mit einer kleinen zweispitzigen Lobe, unten am Aussenrand mit 2—3 kleinen Stacheln, im Übrigen glatt; die Loben an der Spitze der Hinterschenkel mit zwei Stacheln, von denen der untere sehr klein ist, Hinterschenkel im Übrigen glatt; Hinterschienen oben jederseits mit 22—27 grünen, an der Spitze dunklen Stacheln, unten spärlich, gegen die Spitze hin dichter bedornt; Prosternum mit zwei nach hinten konvergierenden Falten und hinter der Spitze derselben einem abgerundeten Höcker; Meso- und Metasternum triangulär mit abgerundeten Seitenlappen; Subgenitalplatte des ♂ bis an die Basis gefurcht, die beiden Zweige schmal, abgeplattet, gerade an der Spitze aufgebogen und breiter, mit abgerundeter Spitze und gleich innerhalb derselben oben mit einem sehr kleinen, einwärts gebogenem dunklen Process; Cerci rund, behaart, nach aussen verjüngt, etwas krumm mit stark einwärts gebogener Spitze.

♂, Länge des Pronotums	6	mm
» der Vorderschenkel	13 —14,5	»
» » Vorderschienen	13,5—15	»
» » Hinterschenkel	31 —34	»
» » Hinterschienen	35 —38	»
» » Deckflügel	46 —49	»
» » Cerci	3,3— 4	»
» » Subgenitalplatte	5,8— 7	»

Fundorte: Itoki Na N'Golo, Juni 1891, 2 ♂ (SJÖST.); Kamerungebirge, Mapanja, ♂ (KNUTSON & VALDAU).

Die Gattung *Gravenreuthia* scheint eine besondere, von *Poreuomenæ* unterschiedene, durch die Aderung der Deckflügel und auch durch die Bucht am Vorderrand der Seitenlappen des Pronotums und die Form der Subgenitalplatte ausgezeichnete Gruppe zu repräsentieren.

Gruppe der Phaneropteræ.

Phaneroptera nana CHARP.

Phaneroptera nana CHARPENTIER, Fieber, 1853, Syn. p. 49; BRUNNER, Monogr. Phaneropt., 1878, p. 212.

Fundorte: Zahlreiche ♂ und ♀ von Kitta u. a. O.

Gruppe der Otiahpysæ.

Tetraconcha fenestrata KARSCH.

Tetraconcha fenestrata KARSCH, Ent. Nachr. XVI, 1890, p. 62 (♂); BRUNNER, Verh. zool.bot. Ges. Wien, XLI, 1891, p. 115, Taf. II. Fig. 20 (♂).

Fundorte: Itoki Na N'Golo, Juni 1891, ♂; Bibundi, Aug., ♂ (SJÖST.); Kamerun, ♂ (THEORIN).

Gruppe der Anaulacomeræ.

Gen. **Dannfeltia** SJÖST. n. g.

Coxæ anticæ spina armatæ; fastigium frontis non laminato productum; vertex non spinosus, fastigium verticis horizontaliter productum, sulcatum, cum fastigio frontis vix contiguum; lamina subgenitalis ♂ stylis nullis instructa; tibiæ anticæ foraminibus utrinque apertis, cum intermediis supra teretes; fermora antica subtus paulo sulcata, intermedia teretia, postica dimidio circiter basali sulcata; ramus radialis furcatus; pronotum lobis deflexis rotunde insertis, disco planiusculo, linea impressa longitudinali et sulco transverso triangulari medio instructum; venis radialibus totis disjunctis.

Generi *Anaulacomeræ** STÅL affinis sed fastigio verticis apice acuto, linea longitudinali pronoti quoque in parte antica impressa, venis radialibus totis disjunctis, ramo primo paulo pone medium oriente, campo tympanali speculo pellucido distinguenda.

Generi *Parapyrrhiciæ* BRUNN. (l. c. 1891, p. 20, 149) quoque affinis sed differt fastigio verticis apice acuto, venis radialibus totis disjunctis, ramo radiali paulo pone medium venæ radialis oriente, ante medium furcato, femora antica subtus paulo sulcata. Lamina subgenitalis ♂ permagna, apicem versus angustior, apice breve bifida; cerci longiores teretes, apice incurvi.

Dannfeltia nana SJÖST. n. sp.

♂: Grün; Deckflügel dicht erhaben netzadrig, am Vorderfeld hyalin, am Hinterfeld allmählich grüner mit schmalem, bräunlichem Rand; Tympanalmembran hyalin; Stirnfeld ziemlich quadratisch, schwach konvex, nach oben triangulär ausgezogen, unten von einer etwas gebogenen Querrinne begrenzt; Fühler grün; Pronotum fein dunkelbraun; Beine, besonders am Schenkel, blutrot punktiert; Unterrand des Pronotums schräg, etwas abgeplattet, mit dem Vorderrand einen abgerundeten, stumpfen Winkel bildend, Hinterrand gleichmässig gebogen; Schulterbucht ziemlich seicht; Vorderschienen unten an der Spitze jederseits mit 1, am Aussenrand mit 1 und am Innenrand mit 2 Dörnchen, im Übrigen mit recht langen weissen Haaren besetzt; Spitzenloben der Hinterschenkel an der Innenseite mit einem kurzen, dreieckigen Dörnchen versehen, an der Aussenseite ungedornt; die basale Hälfte der Hinterschenkel unten deutlich gefurcht; der Innenrand der Hinterschenkel unten gegen die Spitze hin mit 1, der Aussenrand mit 2 sehr kleinen Dornen. Die Hinterflügel überragen die Deckflügel um 6 mm;

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* BRUNNER, Monogr. Phaneropt. 1878, p. 277; Add. Monogr. Phaneropt., 1891 p. 20.

Länge des Pronotums	3	mm
» der Deckflügel	16	»
Breite » »	3,6	»
Länge » Hinterflügel	22	»
» » Vorderschenkel	3,8	»
» » Vorderschienen	4,5	»
» » Hinterschenkel	13,5	»
» » Hinterschienen	15	»
» » Cerci	2	»

Fundort: Kongo, (Dannfelt).

Gruppe der Amblycoryphæ.

Gen. **Eurycorypha** Stål.

Stål, Öfvers. Vet. Akad. Förh. XXX, 4, 1873, p. 40; Rec. Orth. II, 1874, p. 42; Brunner, Monogr. Phaneropt., 1878, p. 272; Add. Monogr. Phaneropt. 1891, p. 136.

Eurycorypha montana Sjöst. n. sp.

Taf. III, Fig. 2.

♀: Grün; Pronotum etwas narbig, oben flach, rektangulär, nach hinten nicht verengt, Hinterrand in der Mitte fast gerade, mit breit abgerundeten Ecken; Vorderrand deutlich und fast winkelig eingebuchtet; Vorderrand der Seitenlappen gerade; Vorderschenkel am Innenrand mit 4 Dornen bewehrt, am Aussenrand ohne Dornen; Vorderschienen oben rund, ungefurcht und ungedornt, nur mit einem äusseren Enddorn, Innen- und Aussenrand mit Dornen; Schenkel des zweiten Beinpaares am Innenrand mit 3, am Aussenrand ohne Dornen, Schienen dieses Beinpaares mit resp. 8 und 7 Dornen; Hinterschenkel unten tief gefurcht, am Innen- und Aussenrand mit 5—8 Dornen; Radialaderast kurz vor der Mitte entspringend und sehr lang gegabelt; Legescheide so lang wie die Vorderschiene, das erste Drittel des Oberrandes glatt, gerade, ungefärbt, der übrige Teil sehr schwach gebogen, tief und braun kreneliert, Unterrand nur an der Spitze braun und kreneliert.

Länge des Pronotums	4,5	mm
Breite » »	3	»
Länge der Deckflügel	27	
Breite » »	9,7	
Länge der Vorderschenkel	5	
» » Vorderschienen	6	
» » Hinterschenkel	14	
» » Hinterschienen	15	»
» » Legescheide	6	»

Fundort: Kamerungebirge, Mapanja, 1884—1885, (KNUTSON & VALDAU).

Das hier beschriebene Exemplar ähnelt sehr der *E. stylata* STÅL. deren Type, ein ♂, zur Vergleichung vorliegt, und ich glaubte daher zuerst, in ihm das bis jetzt unbekannte ♀ dieser Art vor mir zu haben. Indessen sind einige Verschiedenheiten vorhanden, die eine Identificierung mit dieser Art nicht zu erlauben scheinen. Die Flügel sind bei ihm kürzer und breiter und haben einen stärker gebogenen Hinterrand, und der Vorderrand der Seitenlappen des Prothorax ist gerade, bei *E. stylata* aber noch oben etwas eingebuchtet; vom unterem Teil der Augen geht bis fast an die Oberlippe ein sehr deutlicher, innen von einer ziemlich tiefen Rinne begrenzter Kiel, der bei *E. stylata* viel kürzer erscheint und kaum die halbe Entfernung zwischen der unteren Augenspitze und der Oberlippe erreicht. Die Hinterschenkel des vorliegenden Exemplares der *E. stylata* haben am Innenrand nur 2 Dornen; sonst ist die Bedornung der beiden Arten fast ganz gleich.

Von *E. mutica* Karsch (Berl. Ent. Zeitschr., 1891, p. 327) unterscheidet sich *E. montana* durch oben gerundede, nicht »schwach gefurchte» Vorderschienen; der Oberrand der Legescheide ist nur an den äusseren zwei Dritteln, und zwar rotbraun, tingiert, nicht »am ganzen oberen Rande glänzend schwarz».

E. adicra Karsch (l. c. 1892, p. 75) und *E. Brunneri* Branc. (Jahrb. Trenscén XV, 1893, p. 197) sind bedeutend grösser.

E. velicauda Karsch (l. c. 1893, p. 131) hat die Seitenlappen des Pronotums vorn S-förmig geschwungen, die Vorderschenkel unten am Innenrand mit 3 Dornen versehen und die Deckflügel in der Mitte nur 8 mm breit.

Fam. **Mecopodidæ.**

Josef Redtenbacher, Monogr. Übersicht der Mecopodiden, in: Verh. d. zool.bot. Ges. Wien, XLII, 1892, p. 183—224, Taf. III.

Leproscirtus granulosus (Karsch).

Mecopoda (*Euthypoda*) *granulosa* Karsch, Ent. Nachr. XII. 1886, p. 317, ♀; XIV, 1888, p. 147.

Leproscirtus granulosus Karsch, Berl. Ent. Zeitschr. XXXVI, 1891 p. 329, Fig. 3 (♂), 4 (♀); Redtenbacher, Monogr. Mecopod., p. 205.

Eine im dunklen, feuchten Buschwalde zwischen abgefallenen, verfaulenden Blättern gemeine Art. Bei den dunkleren, wahrscheinlich älteren Exemplaren tritt die in der Beschreibung 1891, p. 329, angegebene gelbe Farbe des Gesichts u. s. w. schärfer hervor. Bei den helleren fliest sie mehr mit dem angrenzenden, gelblichen Ton zusammen. Allen vorliegenden ♀ fehlen die Deckflügel vollständig.

Fundorte: Ekundu, 31. Dec. 1890, ♂; Itoki, 4. Febr. 1891, ♀; N'dian, Mai, ♀; Bonge, 22. Sept. ♀ ad.; 13. Nov. ♀ Jun.; Kamerun ohne nähere Angaben 3 ♂, 5 ♀.

Kamerungebirge, Mapanja, ♀ in Spiritus (Knutson & Valdau).

Apteroscirtus denudatus Karsch.

Apteroscirtus denudatus Karsch, Berl. Ent. Zeitschr. XXXVI, 1891, p. 330, Fig. 5; Redtenbacher l. c. p. 206.

In den dichten Buschwäldern von Kamerun zwischen den auf die Erde herabgefallenen, verfaulenden Blättern ist diese Art eine sehr häufige Erscheinung, und dieselbe konnte, wenigstens an den Orten, die ich besuchte und wo solche Wälder sich befanden, wie bei Ekundu, Kitta, Itoki, Bonge, N'dian und Bavo, bei fast jeder Exkursion angetroffen werden. Das ganze Tier ist glatt und glänzend, wie poliert, gelbbräunlich. Längs den Seiten des Rückens zieht sich oft vom Vorderrand des Pronotums bis an die Cerci ein dunkles, oben recht scharf begrenztes, unten gegen den hellen Bauch mehr allmählich verschwindendes Band hin. Dieses kann beim ♂ sehr deutlich sein, ist undeutlicher beim ♀ oder ganz verschwunden. Die zwischenliegende, breite Rückenpartie. die nach vorn am Kopf heller erscheint, ist an den Hinterleibsegmenten gewöhnlich mit einem stärker oder schwächer markierten, dunklen Winkelfleck versehen. Die Oberlippe, die Unterseite des Thorax und die sich längs der Mittellinie des Bauches hinziehende Schildchenreihe ist oft greller gelb als die anliegenden Partien. Die Schienen des 1. und 2. Beinpaares an den Stacheln mit kleinen, dunklen Flecken versehen, welche ihnen ein gebändertes Aussehen verleihen. Die Lappen des dritten Tarsalglieds dunkel. Einige der vorliegenden Exemplare sind klein, mit sehr kurzer Legescheide; die grösseren messen:

	♂	♀	
Länge von der Stirn bis an die Basis der Cerci . . .	26 —28	28—32	mm
» des Prothorax	5,5— 6	6— 7	»
» der Hinterschenkel	30 —32	35—40	»
» » Ovipositor		20—26	»

Fundorte: Ekundu, Kitta, N'dian, Itoki, Bonge, Bavo, 6 ♂ und 9 ♀ in Spiritus; 5 getrocknete ♂ und 2 ♀.

Acridoxena hewaniana WHITE.

Acridoxena hewaniana WHITE, Proc. Roy. Phys, Soc. Edinb., 1865, III, p. 310; REDTENBACHER, l. c. p. 209.

Stália foliata SCUDDER, Proc. Bost. Soc. Nat. Hist. XVIII, 1874—75, p. 454—457; p. 456, Fig. 3—5 (♂).

Eustâlia foliata SCUDDER, Proc. Bost. Soc. Nat. Hist. XX, 1879, p. 95; KARSCH, Ent. Nachr. XII, 1886, p. 145—147; Fig. p. 145 (♂).

Fundorte: zwei ♀ von Ekundu (LÖFDAL) und Kamerun ohne nähere Angaben (LINDOW).

Anoedopoda erosa KARSCH.

Anoedopoda erosa KARSCH, Berl. Ent. Zeitschr. XXXVI, 1891, p. 334, Fig. 7 (♀); XXXVII, 1892, p. 76, Fig. 3 (♂); REDTENBACHER l. c. p. 211.

Lebt im dunklen Buschwalde.

Fundorte: Bonge, 11. Sept. 1891, ♀.

Kamerun, ohne nähere Angaben 1 ♀ (SJÖST.) und 2 ♂ in Spiritus (LINDOW, 1890).

Anoedopoda lamellata (LINN.).

Gryllus lamellatus LINNÉ, Syst. Nat. ed. X, tom I, 1758, p. 429.

Gryllus lamellosus LINNÉ, Mus. Lud. Ulric. Reg., 1764, p. 128.

Mecopoda lamellosa STÅL, Rec. orth, II, 1874, p. 48.

Anoedopoda lamellosa KARSCH, Berl. Ent. Zeitschr. XXXVI, 1891, p. 334.

Anoedopoda lamellata KARSCH, Berl. Ent. Zeitschr. XXXVIII, 1893, p. 135; REDTENBACHER l. c. p. 211.

Lebt im Buschwalde.

Fundorte: Bonge, Sept. 1891, ♀ (SJÖST.); Bibundi, ♂ (JUNGNER); Kamerun, ♀ in Spiritus (LINDOW); Kamerungebirge, Mapanja, 1884—85, ♀ in Spiritus (KNUTSON & VALDAU); Kongo, 3 ♀ (SJÖHOLM).

Macroscirtus preussianus (KARSCH.).

Sthenaropoda preussiana KARSCH, Berl. Ent. Zeitschr. XXXVI, 1891, p. 332, Fig. 6.

Macroscirtus preussianus, REDTENBACHER l. c. p. 217.

Allgemein im feuchten, dunklen Buschwalde, wo er zwischen verfaulenden Blättern umherhüpft.

Fundorte: Kitta, 23. März 1891, ♂, 10. April, ♂; N'dian, 20. u. 30. Juni ♂♀; Kamerun, ♀ in Spiritus.

Macroscirtus acutipennis (KARSCH.).

Mecopoda (Euthypoda) acutipennis, KARSCH, Berl. Ent. Zeitschr. XXX, 1886, p. 116, Taf. IV, Fig. 3.

Macroscirtus acutipennis REDTENBACHER l. c. p. 218.

Fundort: Ein ♀ aus West-Afrika liegt, ohne nähere Angaben, vor.

Gen. **Corycus** Sauss.

Saussure, Ann. Soc. Ent. France, (4) I, 1861, p. 487; Krauss, Spengel Zool. Jahrb. Syst. V, 1891, p. 349; Redtenbacher, Verh. d. zool.bot. Ges. Wien, XLII, 1892, p. 220.

Corycus Jurinei Sauss.

Corycus Jurinei Sauss., Ann. Soc. Ent. Fr. (4) I, 1861, p. 489 (♂). Krauss, Zool. Jahrb. Syst. V, 1891, p. 352, Taf. XXX, Fig. I (♂), 1 B (♀).

Fundort: Ein ♂ (Lindow) und ein ♀ (Sjöst.) aus Kamerun.

Corycus abruptus Krauss.

Corycus abruptus Krauss, Zool. Jahrb. Syst. V. 1891, Taf. XXX, Fig. 2 (♂).

Fundort: Ein ♂ dieser von Gabun beschriebenen Art im Nov. 1891 von Bonge erhalten.

Corycus siccifolium Sjöst. n. sp.

Taf. I, Fig. 2.

♀: Das ganze Tier gelblich graubraun, etwa wie ein getrocknetes Blatt; Kopf, mit Ausnahme der Stirnpartie zwischen den Fühlern, die netzartig eingedrückt punktiert erscheint, glatt; Pronotum in der Mitte mit einer nach hinten und vorn allmählich verschwindenden, rinnenförmigen Längslinie und dicht netzartig eingedrückt punktiert; Unterrand der Seitenlappen schwach gebogen, Vorderwinkel etwas stumpf, abgerundet, Hinterwinkel etwas mehr gerundet; Deckflügel zwischen dem hinteren und inneren Rand sehr deutlich ausgeschnitten, aber nicht unregelmässig gezackt; vor diesem Ausschnitt wie bei dem ♀ von *C. Karschi* und *C. præmorsus* ein hyaliner Fleck; Form und Aderung der Flügel ist näher aus der Abbildung zu ersehen; Legescheide an der Basis gelblich, im Übrigen dunkel kastanienbraun.

Länge von der Stirn bis an die Spitze der Deckflügel	40	mm
» des Pronotums	9	
der Deckflügel	35	»
» » Vorderschenkel	11	»
» » Vorderschienen	11.3	»
» » Hinterschenkel	26	

Länge der Hinterschienen . . . . 27 mm
» » Legescheide . . . . 14 »

Es ist leicht möglich, dass diese Art das bis jetzt unbekannte ♀ des *C. abruptus* (KRAUSS l. c. p. 354) ist, der, wie *C. siccifolium*, aus Gabun stammt. Von *C. Jurinei* ♀ [vergl. KRAUSS l. c. p. 352, Taf. XXX, Fig. 1 B.] ist diese Art durch den Ausschnitt der Flügel sehr gut unterschieden, so auch durch den hyalinen Fleck derselben, eine geringere Grösse, die vorne mehr gefurchten Vorderschienen, das flache, in das Seitenfeld winkelig, nicht abgerundet, übergehende Tympanalfeld, das Fehlen des schwarzen, triangulären Flecks in der Mitte des Pronotums, eine abweichende Aderung der Flügel, stärker gebogene Legescheide, weniger glänzende Oberfläche und bräunliche, statt grüne Farbe.

Von *C. præmorsus* ♀ [vergl. KRAUSS, l. c. p. 355, Taf. XXX, Fig. 4, 4 A.] unterscheidet sie sich durch eine bedeutendere Grösse und andere Aderung der Flügel, auch ist der Ausschnitt derselben fast ganzrandig, nicht unregelmässig gezacht und ihr hyaliner Fleck nicht speciell von durchsichtigen Flecken umgeben. Dagegen sind die ganzen Deckflügel sehr dicht mit eingedrückten, feinen, durchsichtigen Pünktchen bestreut, die oft längs den Adern und dem Aussenrand der Flügel etwas grösser sind. Von dem hier beschriebenen ♀ des *C. Karschi* ist dieses ♀ durch bedeutendere Grösse und eine sehr verschiedene Aderung der Flügel, die aus den Abbildungen näher hervorgeht, gut unterschieden.

C. Greffi ♀ [vergl. KRAUSS l. c. p. 357, Taf. XXX, Fig. 5 H] ist viel kleiner, und *C. intermedius* ♀ [vergl. REDTENBACHER l. c. p. 221, Fig. 12] hat eine viel längere, anders geformte Legescheide.

Fundort: Gabun, (THEORIN).

Corycus Karschi KRAUSS.

Taf. III, Fig. 3.

Corycus Karschi KRAUSS, Spengel Zool. Jahrb. Syst. V, 1891, p. 355, Taf. XXX, Fig. 3 (♂); KARSCH Berl. Ent. Zeitschr. XXXVII, 1892, p. 77.

Unter einigen von den Herren KNUTSON und VALDAU in den Jahren 1884—85 in dem Kamerungebirge eingesammelten, dem Reichsmuseum zu Stockholm überlieferten Orthopteren befinden sich zusammen in einem Fläschchen zwei *Corycus*-Exemplare, ein ♂ und ein ♀. Das erstere hat sich als der bisher nur als ♂ bekannte *C. Karschi* erwiesen, und es findet sich kein Grund, nicht auch das nebenliegende ♀, das jedenfalls eine noch nicht beschriebene Form darstellt, als derselben Art angehörend zu betrachten. Karsch's Vermutung (Berl. Ent. Zeitschr. 1891, p. 336) dass *C. præmorsus* das ♀ des *C. Karschi* sei, scheint deshalb nicht richtig zu sein. Das genannte ♀ hat folgendes Aussehen.

Die allgemeine Farbe ist ziemlich dunkel graubraun, getrocknet heller, Beine, mit Ausnahme gegen die Basis hin, und die Legescheide noch dunkler; Vorderschienen am Innenrand mit 6, am Aussenrand mit 4 Dornen versehen; Vorderschenkel ganz ohne Dornen, und ebenso auch die Hinterschenkel, die indessen unten gegen die Basis hin einige Dörnchen haben können; Scheitel ringsum bis an den hinteren Rand der Augen glatt, vorne grob eingedrückt punktiert; Pronotum oben ganz flach, grob und dicht eingedrückt punktiert; Seitenloben gerade herabhängend mit abgerundetem vorderen und winkeligem hinteren Übergang vom Discus; Vorderecke einen stumpfen Winkel bildend, Unterseite gerade, Hinterrand gebogen; Hinterrand der Flügel fast gerade, etwas schräg abgeschnitten; die innere, untere Ecke ausgekerbt, der Rand dort kaum bemerkbar wellig; schräg nach vorn von diesem Ausschnitt ein hyaliner Fleck; die Aderung näher aus der Abbildung zu ersehen; das Tympanalfeld flach, die Vena dividens rinnenförmig eingesenkt.

	♂	♀	
Länge von der Stirn bis an die Spitze der Deckflügel	40	35	mm
» des Pronotums	9	7,3	»
» der Deckflügel	33	29	»
» » Vorderschenkel, mit dem Trochanter	9	10	»
» » Vorderschienen	8,5	9	»
» » Hinterschenkel	21	20,5	
» » Hinterschienen	20,5	20	»
» » Subgenitalplatte und der Legescheide	8	12	»

Kamerungebirge, Mapanja (Knutson & Valdau).

Fam. Pseudophyllidæ.

C. Brunner von Wattenwyl, Monographie der Pseudophylliden, herausgegeben von der K. K. zool.bot. Ges. Wien, 1895. 282 Sid., 10 Pl. 122 Fig.

Gen. **Mustius** Stål.

Stål. Recensio Orthopterorum. II, 1874, p. 50; Karsch. Berl. Ent. Zeitschr. XXXVI, 1891, p. 79; Brunner, Monogr. Pseudophyllid. p. 24.*

Mustius Afzelii Stål.

Taf. I. Fig. 3.

Pseudophyllus Afzelii, Stål, Öfv. Vet. Akad. Förh. 1873. N:r 4, p. 48,2. *Mustius Afzelii* Stål, Rec. Orth. II, 1874, p. 67; Karsch, Berl. Ent. Zeitschr. XXXVI, 1891, p. 81. ex. p. [Diagnos und Syn.]

Pallide olivaceo-flavescens; elytris apiceque areæ radialis elytrorum pallide virescentibus, illorum venis principalibus flavescentibus, margine imo exteriore basin versus fusco; antennis nigris, annulis remotis parteque basali sordide pallide flavescentibus. ♀ Long. corp. 40. pron. 8. elytr. 60, alar. 63, fem. post. 20. ovipos. 15, lat. elytr. media 22 mm. Patria: Sierra Leona (Mus. Holm.).

Caput fere uti in *Onomarcho leuconoto* formatum, læve, nitidum, genis anterius parce punctatis, fastigio verticis prominulo. Antennæ longissimæ, gracillimæ, elytris longiores. Pronotum obsolete remoteque alutaceum, apice obtusissime subrotundatum, basi obtuse subangulatum, sulco anteriore minus profundo. Anguli antici mesosterni in processum parvum erectum prominuli. Fermora omnia subtus in utroque margine denticulata, denticulis femorum anteriorum minutissimis femorum posteriorum distinctissimis, majoribus. Tibiæ anticæ superne in margine exteriore, intermediæ in margine interiore denticulis obsoletissimis nonnulis armatæ, posticæ in marginibus omnibus denticulis distinctis præditæ. Ovipositor parte tertia apicali et marginis inferioris parte dimidia posteriore niger. Lamina supraanalis inter cercos in lobum magnum ovalem, cercis nonnihil breviorem, producta. Lamina subgenitalis sensim nonnihil angustata, apice obtusangulariter late emarginata. (Stål.)

In seinen Orthopterologischen Beiträgen, IV, [Berl. Ent. Zeitschr. 1891, p. 81] hat Karsch unter dem Namen *Mustius afzelii* Stål eine von Kamerun und Kongo erhaltene Form

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* Zeile 5 v. o. steht pone medium statt ante medium.

beschrieben und abgebildet. Diese Art liegt mir jetzt in vier Exemplaren, 2 ♂, 2 ♀, ebenfalls von Kamerun und Kongo, vor. Die Identificirung derselben mit STÅLS *Mustius Afzelii* aus Sierra Leone, dessen Type geichfalls vorliegt, ist indessen unrichtig.

Die von KARSCH in lateinischer Sprache gegebene Diagnose ist aus STÅLS Beschreibung und Diagnosen des *M. Afzelii* zusammengesetzt, und dieselbe bezieht sich also auf diese Art. Die darauf folgende Beschreibung (Zeile 1—23 v. u.) wie auch die Abbildungen (Fig. 1, ♂; 1 a, ♀) beziehen sich dagegen nicht auf *M. Afzelii*, sondern auf eine von ihm sehr verschiedene, mit ihm verwechselte Art, die hier unter dem Namen *Mustius superbus* beschrieben ist.

Die Verschiedenheiten zwischen diesen beiden Arten sind unter *M. superbus* näher angeführt.

Mustius superbus SJÖST. n. sp.

Mustius Afzelii nec STÅL, KARSCH, Berl. Ent. Zeitschr. XXXVI, 1891, p. 81, ex. p. [Zeile 1—23 v. u.] Taf. II, Fig. 1, ♂, 1 a, ♀; Ins. d. Berglandsch. Adeli, I. Abt. o. c. 1893, p. 136; BRUNNER VON WATTENWYL, Monogr. der Pseudophyllid. 1895, p. 25, ex. p.; Taf. 1, Fig. 1.

Das ♀ grösser als das ♂; Kopf, Körper und Beine blass horngelblich; Fühler schwarz und gelb geringelt, die schwarzen Ringe nach unten schmäler, nach aussen breiter als die gelben; Spitzenrand der Schenkel, Gehörorgan, Spitzenrand der Schienen, erstes, drittes und viertes Tarsusglied der Vorderbeine schwarzbraun; der obere Rand der Schienenspitzen der Mittel-und Hinterbeine sowie auch ein Punkt oben am ersten und zwei Punkte oben an den anderen Tarsusgliedern derselben schwarzbraun; Pronotum grüngelb, bei Spiritusexemplaren gelb, mit schwarzem unteren Vorderrand, spärlich granuliert, die zwei Querrinnen sehr deutlich, die hintere bisweilen tiefer; Deckflügel gelbgrün oder gelb und beim ♀ besonders längs den Queradern und dem Innenrand rosafleckig; beim ♂ die Flecke grün, mehr zerstreut am Innenrand, der hier gestreift erscheint, keine Flecke vorhanden; beim ♀ die Spitzen aller in den Rand der Deckflügel, beim ♂ nur die in den Aussenrand mündenden Adern und Aderäste schwarz berandet; zwichen der hinteren Radialvene und dem Ramus radialis und zwischen dem letzteren und der vorderen Ulnarvene beim ♂ 4, beim ♀ 5—6 Queradern; etwa die zwei inneren Drittel des Oberrandes der schwarzen Partie der Legescheide fein sägezähnig; Cerci des ♂ gerade, nach aussen etwas verjüngt und mit einer kleinen, feinen, einwärts gebogenen Spitze versehen; die des ♀ kaum bemerkbar aufwärts gebogen, nach aussen etwas mehr verjüngt, ohne einwärts gebogene Spitze; Lamina subgenitalis beim ♂ an der Basis breit, in der Mitte plötzlich stark verschmälert, mit feinem äusserem, in zwei gerade, lange, feine artikulierende Griffel endigendem Teil.

	♂	♀	
Länge des Pronotums	5,7— 6	7 — 7,3	mm
Breite » » unten	7	8,5	»
Länge der Deckflügel	45 —46	55	»
Breite » »	17 —18	18	
Länge der Vorderschenkel	7 — 7,5	7 — 8	»
» » Vorderschienen	7.5	8 — 9	»
» » Hinterschenkel	15 —15,5	17,5—18	»
» » Hinterschienen	14,5	17 —18	»
» » Legescheide		15 —16	»
» » Cerci	2,2	4	»
» » Griffel	1.3		»

Fundorte: Kamerungebirge, ♂ ♀ (Knutson & Valdau); Kamerun, ♂ (Sjöst.); Kongo, ♀.

Diese stattliche Art, «die farbenschönste Pseudophyllide Afrika's», unterscheidet sich von *Mustius Afzelii* durch eine geringere Grösse, eine verschiedene Aderung und rel. schmälere, mit rosagefärbten oder grünen Flecken versehene, nicht einfarbig blaugrüne Deckflügel. Die ganzen Fühler sind gelb und schwarz geringelt, die schwarzen Ringe nach unten schmäler, nach aussen breiter als die gelben, wogegen *M. Afzelii* unten ganz gelbe, aussen schwarze, mit ziemlich schmalen gelben Ringen versehene Fühler hat. Die Vorderbeine haben die Schenkel und Schienen an der Spitze sowie auch das 1. 3. und 4. Tarsalglied schwarzbraun gefärbt, während diese Beine bei der anderen Art einfarbig erscheinen.

Um diese Art zu der Gattung *Mustius* Stål zählen zu können, mit der sie in allen wichtigen Charakteren übereinstimmt, ist die erste Zeile der Diagnose derselben [l. c. 1874, p. 50] «elytris ultra medium sensim leviter ampliatis» als Genus-Charakter zu strechen, da dieses hier nicht der Fall ist.

Wie bei *M. Afzelii* mündet die vordere Ulnarvene an dem Hinterrand der Deckflügel.

Mustius eurypterus KARSCH.

Mustius eurypterus KARSCH, Stett. Ent. Zeit. LVII, 1896, p. 347.

Ein anscheinend dieser Art angehörendes, vom Spiritus gebleichtes Exemplar liegt vor.

Länge des Pronotums	7 mm
» der Deckflügel	49 »
» » Hinterschenkel	18 »
» » Legescheide	15 »

Fundort: Kamerungebirge, (KNUTSON & VALDAU).

Matæus guineensis (BOL.).

Mustius Guineensis BOLIVAR, Anales Soc. Esp. Hist. Nat. XV, 1886. p. 343.

Matæus longipennis KARSCH, Berl. Ent. Zeitschr. XXXVI, 1892, p. 84.

Matæus Guineensis BRUNNER, Monogr. Pseudophyll. p. 28.

Fundort: Bonge, 2 Dec. 1891.

Gen. **Pleminia** STÅL.

Pleminia STÅL, Rec. Orthopt. II, 1874 p. 61; BRUNNER, Monogr. Pseudophyllid. 1895, p. 122.

Habrocomes KARSCH, Berl. Ent. Zeitschr. XXXVI, 1891, p. 102.

Pleminia personata SJÖST. n. sp.

Das ganze Tier matt graubraun mit hyalinen, bräunlich berauchten Hinterflügeln ohne helle Begrenzung der Queradern; Beine und Unterränder des Pronotums dicht, weich und wollig behaart; Gesicht blauschwarz mit gelblich glänzenden Seiten und ebensolcher Oberlippe, oben von der Farbe des Pronotums und, wie das Tier im Übrigen, mattfarbig; Vorderschenkel unten am Innenrand mit 4 Dornen; Vorderschienen unten mit 7 Paar Dornen; Mittelschenkel und Mittelschienen mit resp. 4 und 6—7 Dornen; Mittelschienen oben mit 2 sehr deutlichen Dornen; Hinterschenkel am Aussenrand mit 7 Dornen, am Innenrand ohne Dornen; Hinterschienen oben am Innenrand mit 11 grossen, lamellenartigen Dornen, am Aussenrand mit 7—9 gewöhnlichen Dornen; Deckflügel schmal, gleichbreit mit breit abgerundeter Spitze; Speculum hyalin; Cerci grob, gerade mit rechtwinkelige ingebogener, in einen kurzen, feinen Dorn endigender Spitze; Subgenitalplatte nach aussen verschmälert, an der Spitze gegabelt und mit zwei beweglichen, gleich schmalen, geraden, ziemlich langen Griffeln endigend.

Länge des Pronotums	7	mm
Breite » »	6,5	»
Länge der Deckflügel	24	»
Breite » »	5	»
Länge » Vorderschenkel	9	»
» » Vorderschienen	9	»
» » Mittelschenkel	7	»
» » Mittelschienen	6	»
» » Hinterschenkel	17	»
» » Hinterschienen	16	»
» » Cerci	2,5	»
» » Griffel	1,5	»

Fundort: Kamerungebirge, ♂ (Knutson & Valdau).

Gen. **Lichenochrus** Karsch.

Karsch, Berl. Ent. Zeitschr. XXXVI, 1891, p. 105: Brunner, Monogr. Pseudophyllid. 1895, p. 125.

Lichenochrus marmoratus Sjöst. n. sp.

♂: Stirn und Oberlippe schwarz oder schwarzblau; Sternalschilder glänzend schwarz, die Dornen des Prosternums, die vorderen Ecken des Mesosternums und die Seitenränder des Metasternums gelblich; Bauchschilder gelbbräunlich; Beine gelblich, die äusseren Tarsalglieder, der obere und untere Teil der Schienen und die äussere Hälfte der Schenkel der Vorderbeine oben, der grösste Teil der Tarsen und Schienen sowie die äussere Hälfte der Schenkel der Mittelbeine ringsum und ein breites, oberes und zwei untere Bänder an der Aussenseite der Schenkel, die Schienen und die zwei äusseren Glieder der Hinter beineviolettbräunlich; die Hinterschienen mit zwei breiten gelben Bändern und die Hinterschenkel an der Innenseite glänzend rotbraun; die Beine mit dicht in Reihen stehenden kurzen, weissen Haaren bewachsen und auch an den grösseren Dornen mit ähnlichen Haaren versehen; Mittelschenkel unten mit 4, Hinterschenkel mit 7 grossen, gebogenen Dornen; Mittelschienen oben mit 2 Dornen, der äussere Dorn der linken Schienen undeutlich; Flügel hyalin, mit braunen sowohl gröberen, wie feineren Adern und einem breiten, ganz hyalinen Mittelband mit heller Aderung und ziegelroten, unregelmässigen Flecken ganz wie von einer Pilzkrankheit herrührend; Hinterflügel einfarbig dunkel beraucht und ohne helle Begrenzung der Adern; Fühler braun mit gelblichen Ringen; Cerci kreisrund, nach aussen verschmälert, schwach einwärts gebogen, an der Spitze abgerundet, mit einem winzig kleinen, einwärts gerichteten Zahn; Lamina supraanalis triangulär, in der Mitte mit einem deutlichen Eindruck; Lamina subgenitalis nach aussen verjüngt, an der Spitze gefurcht, mit kreisrunden, an der Spizte abgerundeten, geraden Griffeln; Analsegment abgerundet.

Länge des Pronotums	7,5	mm
» der Deckflügel	31	»
Breite » »	7,5	»
Länge » Vorderschenkel	10	
» » Vorderschienen	10,5	»
» » Mittelschenkel	9	»
» » Mittelschienen	10	»
» » Hinterschenkel	22	»
» » Hinterschienen	22	»
» » Cerci	4,5	»
» » Griffel	1	»

Fundort: Der Buschwald bei Itoki, 3. Jan. 1891.

Wie *L. Osorioi* Bol. und *L. turpis* Br. (Brunner, Monogr. Pseudophyll. p. 126), hat auch diese Art ein schwarzes Gesicht.

Von der ersteren Art unterscheidet sie sich durch längere und verschieden gefärbte Flügel, längere Hinterschenkel, eine grösstenteils weisse Oberlippe und den Besitz nur eines Dornes am Oberrand der Mittelschienen.

Mit dem nur als ♀ bekannten *L. turpis* kann sie der geringeren Grösse wegen nicht vereinigt werden. Von dem ♂ aus Brasilien, das Brunner eigenthümlicherweise als ♂ der genannten Art aufstellt, unterscheidet sich das vorligende ♂, wie das ♀ des *L. turpis* u. a. durch eine schwarze Brust und einen bedornten Oberrand der Mittelschienen.

Lichenochrus maculosus Sjöst. n. sp.

Taf. II, Fig. 2.

♀: Stirn hell, graubläulich angehaucht, Oberlippe fast weiss; Brust glänzend schwarz, die Dornen des Prosternums, die Vorderecken und der Hinterrand des Mesosternums, die Seiten und der Hinterrand des Metasternums gelblich; Beine gelblich, bis an die Basis dunkel schattiert und dicht gefleckt; Hinterschenkel an der Innenseite rotbraun, nach aussen gefleckt und mit einem breiten, gelblichen Band, das an der Aussenseite nicht vorhanden ist, versehen; Vorderschenkel unten mit 3, Mittelschenkel mit 4 und Hinterschenkel mit 6—7 hellen, schwarzspitzigen Dornen; die Dornen der Mittelschienen auch an der Basis teilweise schwarz; Mittelschienen oben mit 1 Dorn, etwa die zwei oberen Drittel dieser Schienen erweitert und deutlich zusammengedrückt; der Process am Vorderrand des Pronotums deutlich; Deckflügel hyalin, gelbbräunlich angehaucht und mit ziemlich grossen, braunen Flecken, die am äusseren Teil der verschiedenen Flügelfelder gelegen sind; Hinterflügel einfarbig dunkel beraucht; Legescheide gleichmässig gebogen, etwa die äussere Hälfte (9 mm) schwarz, der übrige Teil gelblich, oben an der Basis teilweise schwarz.

Länge des Pronotums	7	mm
» der Deckflügel	31	»
Breite » » an der Basis	8	»
Länge der Vorderschenkel	10	»
» » Vorderschienen	10	»
» » Mittelschenkel	11	»
» Mittelschienen	10	»
» » Hinterschenkel	22	»
» » Hinterschienen	21	»
» » Legescheide	17	»

Fundort: Itoki, 4. Febr. 1891, ♀.

Diese Art steht *Lichenochrus decoloratus* Brunner [Monogr. Pseudophyll. p. 128] nahe und hat, wie dieser, eine helle, graubläulich angehauchte Stirn. Dagegen ist die Brust nicht, wie bei *L. decoloratus*, von derselben Farbe wie die Stirn sondern schwarz.

Von *L. Osorioi* Bol. (Brunner, l. c. p. 129) unterscheidet sie sich durch ihre helle, nicht schwarze Stirn und die oben mit nur einem Dorn versehenen Mittelschienen.

Von der ebenfalls afrikanischen Art *L. turpis* BRUNNER, l. c. p. 130 unterscheiden sie die helle Stirn, die unten 6- 7, nicht 10- stacheligen Hinterschenkel und die geringere Grösse. Ihre Vorderschenkel sind nur wenig, ihre Mittelschenkel dagegen ziemlich stark zusammengedrückt.

Lichenochrus flavifrons SJÖST. n. sp.

♂: Stirn glänzend hell braungelb, ein Strich quer über das Gesicht oberhalb dem Epistom, Mandibeln, Ränder der Fühlergruben und die sich zwischen diese hinaufschiebende Stirnspitze glänzend schwarz; auch das dicke Basalglied der Fühler schwärzlich (Fühler im Übrigen abgefallen); Prosternum schwarzbraun mit gelblichen langen Dornen; Mesosternum (5 × 2,4 mm) gelb mit schwarzen Furchen und schwarzem, hinterem Mittelteil, die Seiten vorne in kleine Höcker ausgezogen; Metasternum schwarz mit einem gelben Fleck an den äusseren Seiten, nach hinten deutlich verengt (vorne 6, hinten 4,3 mm; Länge 2,3 mm); Kopfseiten, Scheitel, Pronotum und Beine einfarbig matt, schmutzig braungelblich, alle Dornen hell, nur an der äussersten Spitze schwarz; die Dornen an der Unterseite der Schenkel resp. 3, 4 und 6—7; Hinterlappen des Pronotums ziemlich gross und stark aufgebogen und mit zwei deutlichen, abgerundeten Höckern; Deckflügel braungelblich mit heller Aderung; die Queradern des Radialfeldes dunkel gesäumt; Hinterflügel einfarbig dunkel beraucht; Subgenitalplatte gleichmässig aufwärts gebogen, die ganze Mittelpartie dunkel, an der Spitze gegabelt, nach aussen sehr wenig verschmälert; Griffel 3 mm lang, kreisrund, gleichbreit; Cerci kreisrund und wenig gebogen, nach aussen nur wenig verschmälert, an der Spitze ein wenig keulig angeschwollen und an der Innenseite mit einem winzig kleinen Dorn versehen.

Länge des Pronotums	8,7	mm
» der Deckflügel	38	»
Breite » »	9	»
Länge Vorderschenkel	11	»
» » Vorderschienen	12	»
» » Mittelschenkel	10	»
» » Mittelschienen	10	»
» » Hinterschenkel	23	»

Länge der Hinterschienen . . . . 23 mm
» » Cerci . . . . 4 »

Fundort: N'dian, Mai 1891, ♂.

Von *Tympanocompus acclivis* Karsch (Berl. Ent. Zeitschr. 1891, p. 107, Fig. 16.), dem diese Art sehr ähnelt, unterscheidet sie sich durch die mit einem winzig kleinen Dorn versehenen, nicht ganz unbewaffneten Cerci, den schärfer sattelförmig aufgebogenen Hinterlappen des Pronotums und die grössere Ausbreitung der gelben Farbe der Sternalschilder.

Gen. **Orchestridoptera** Sjöst. n. g.

Fastigium verticis triangulare, concavum, margines scrobum antennarum haud superans; antennæ longæ, unicolores, rufescentes, basi obscuriores, articulo basali spina armato; pronotum semicylindricum, dense, obtuse granulosum, margine antico rotundato, subtuberculato, infero latissimo, recto, medio sicut paulo inciso, postico medio subrecto, sinu humerali vix conspicuo, latissimo, sulco transverso postico distincto, antico obscuro; metazona pronoti distincte brevior quam pro-et mesozona unitæ; prosternum longe bispinosum; mesosternum antice truncatum, margine haud limbato, sulcis a foveolis orientibus cruciatis, angulis anticis tuberculato-productis, sulco posteriore medio foveola instructo; metasternum mesosterno latius, foveolis inter se fere æque remotis quam a margine laterali, sulco arcuato conjunctis; pedes longi; femora omnia supra inermia, modice compressa, antica subtus 4—6-, intermedia 4-, postica 7- spinulosa; tibiæ intermediæ superne spinulis duabus armatæ; tibiæ anticæ in utroque latere foramine rimæformi-conchato instructæ; lobi geniculares omnes, lobo interno femorum intermediorum excepto, in spinam parvam introrsum valde incurvam producti; elytra attenuata, apicem femorum posticorum non multum superantia; venæ radiales totæ disjunctæ, ramus radialis ad medium oriens; alæ infumatæ, unicolores; cerci ♀ subrecti, teretes, apicem versus attenuati; lamina subgenitalis ♀ triangularis, apice truncata et paulo incurvata; ovipositor validus, plus quam medio exteriore niger, margine superiore subrecto, partim minutissime serrulato, infra medium paulo sinuato, margine inferiore sensim curvato, versus basin leviter sinuato.

Steht der Gattung *Mormotus* Karsch am nächsten (vergl. Brunner, Monogr. Pseudophyll., p. 17 u. 153), unterscheidet sich aber von ihr durch rel. bedeutend längere Beine, kürzere Flügel und die 4—6 Dornen am inneren Unterrand der Vorderschenkel.

Orchestridoptera rufipes Sjöst. n. sp.

Taf. I, Fig. 1 a, 1 b.

♀: Kopf, von vorn gesehen, oval, ziemlich gross mit weisser, bläulich angehauchter Stirn; Fühler und Beine einfarbig glänzend schön hell kastanienbraun, die Basalglieder der Fühler dunkler; Dornen der Mittel- und Hinterschenkel etwas heller und mit schwarzer Spitze; Pronotum stark granuliert, etwas dunkler; Deckflügel einfarbig rotbräunlich mit erhabener Aderung, Hinterflügel dunkel beraucht.

Länge	des	Pronotums	10	mm
»	der	Deckflügel	40	»
Breite	»	»	9	»
Länge	»	Vorderschenkel ohne Trochanter	15,5	»
»	»	Vorderschienen	16	»
»	»	Mittelschenkel	14	»
»	»	Mittelschienen	15	»
»	»	Hinterschenkel	30	»
»	»	Hinterschienen	32	»
»	»	Legescheide	25	»

Fundort: Diese ausgezeichnete, schöne Art ist von Kamerun mitgebracht worden.

Mormotus Montesi (Bol.).

Platyphyllum Montesi Bolivar, Anales de la Soc. espan. de hist. nat. XV, 1886, p. 347.

Mormotus nigrospinosus Karsch, Berl. Ent. Zeitschr. 1891, p. 111.

Mormotus Montesi Brunner, Monogr. Pseudophyll. p. 155.

Zwei vorliegende ♂ eines *Mormotus* stimmen im Allgemeinen gut mit Karsch's Beschreibung l. c. dieser Art überein, doch sind bei ihnen das Gesicht und die Oberlippe nicht »fusci», sondern weiss, ganz wenig graubläulich angehaucht, und die Brustschilder lederfarbig; nur die eingedrückten Linien, und am Metasternum auch die Mitte, zeigen sie dunkel gefärbt. Auch sind ihre Flügel länger, als für das ♂ angegeben ist, aber nicht länger, als die des ♀. Da *Mormotus Montesi* von der Station Barombi, Fernando Po und Old Calabar erhalten worden ist und der Fundort der vorliegenden Exemplare zwischen diesen Orten liegt, dürfte es sich hier um dieselbe Art handeln.

Bolivar sagt in seiner Beschreibung nichts über die genannte Farbenzeichnung.

Länge des Pronotums	8,5— 8,8	mm
» der Deckflügel	45 —47	»
Breite » »	9,6—10	»
Länge der Vorderschenkel	12	mm
» » Vorderschienen	12	»
» » Mittelschenkel	11	»
» » Mittelschienen	12	»
» » Hinterschenkel	26	»
» » Hinterschienen	26	»

Fundort: Kamerun, 2 ♂.

Semiophygas arescus Karsch.

Semiophygas arescus Karsch, Stett. Ent. Zeit. LVII, 1899, p. 349.

Ein mit der Beschreibung dieser Art im Ganzen gut übereinstimmendes Exemplar liegt vor. Die Adern der Hinterflügel sind jedoch weiss, wie bei dem von Kamerun beschriebenen, grösseren *S. hadrus* (l. c. p. 350). Das Tier oben grünlich, unten fleichfarben, Beine teilweise etwas grünlich angehaucht; Punkte des Radialfeldes rot.

Länge des Pronotums	4,8	mm
» der Deckflügel	20	»
» » Vorderschenkel	5,5	»
» » Vorderschienen	5,3	»
» » Mittelschenkel	5,3	»
» » Mittelschienen	4,8	»
» » Hinterschenkel	8,5	»
» » Hinterschienen	7,9	»

Fundort: Itoki, 1891, ♂.

Fam. Conocephalidæ.

Josef Redtenbacher, Monographie der Conocephaliden, in: Verhandl. der K. K. zool.bot. Ges. Wien, Bd. XLI, 1891, p. 315—562, Taf. III und IV.

A. GRIFFINI, Tentamen catologi Conocephalidum pone editionem monographiæ Redtenbacheri (1891) usque ad finem anni 1897 descriptorum, vel in illa monographia deficientium, vel nova patria, novis synonymis, nova descriptione auctorum, in: Miscell. Ent. VII, 1899, p. 4—10 etc.

Pseudorhynchus hastatus (BOL.).

Pyrgocorypha hastata BOLIVAR, Orthopt. de Africa d. Mus. de Lisboa 1890, p. 222.
Pseudorhynchus hastatus BRUNNER, l. c. p. 366.

Die vier parallelen, dunklen Linien oben und die zwei etwas breiteren an den Seiten des Pronotums sind bei dem Kamerun-Exemplar sehr deutlich und setzen sich bei ihm, allmählich verschwindend, auch auf den Kopf fort.

♀ Länge des Pronotums	11,2—12	mm
» » Fastigiums	9	»
» der Deckflügel	53 —55	»
Breite » »	9 —10	»
Länge » Vorderschenkel, ohne Trochanter	11 —11,5	»
» » Vorderschienen	11	»
» » Hinterschenkel	24	»
» » Hinterschienen	24	»
» » Legescheide	25	

Das Kongo-Exemplar hat die ganze Unterseite des Kopfes und der Schenkel scharf rotbraun schattiert.

Fundorte: Kamerungebirge, (KNUTSON & VALDAU) ♀; Kongo, (SJÖHOLM) ♀.

Pseudorhynchus nigrifrons REDT.

Pseudorynchus nigrifrons REDTENBACHER, l. c. p. 368.

Fundort: Ein ♀ dieser ausgezeichten Art von Bonge in Kamerun, Oct. 1891.

Conocephalus mandibularis (CHARP.).

Locusta mandibularis CHARPENTIER, Horæ Entom., 1825, p. 106.
Conocephalus mandibularis BRUNNER, l. c. p. 427.

Wie BRUNNER a. a. O. p. 429 vermutet, ist *Conocephalus ambiguus* STÅL, von welcher Art STÅLS Type vorliegt, mit *C. mandibularis* identisch.

Das grösste der mitgebrachten Exemplare, ein schönes ♀, hat folgende Dimensionen.

Länge des Pronotums	8	mm
» der Deckflügel	47	»
» » Hinterschenkel	29	»
» » Legescheide	28	»

Fundort: Bonge, Sept. 1891 u. s. w. Sehr allgemein.

Xiphidium senegalense (Krauss).

Orchelimum senegalense Krauss, Sitzungsber. d. Akad. d. Wiss. z. Wien LXXVI, 1877, p. 32.

Xiphidium senegalense Brunner, l. c. p. 504, ♀; Karsch, Berl. Ent. Zeitschr. XXXVI, 1891, p. 338; XXXVIII, 1893, p. 142.

Das bisher nur kurz beschriebene ♂ hat folgendes Aussehen: Hellgrün mit violettrötlichen Kopfseiten und einem Anstrich von dieser Farbe am Meso- und Metathorax; Tarsen etwas bräunlich schattiert; Fühler haarfein, lang und gelb mit schwarzen, schmalen Ringen, die nach aussen mehr getrennt und undeutlich sind, wodurch die Fühler ziemlich dunkel einfarbig erscheinen; Dornen der Vorder- und der Mittelschienen 6 an der Zahl, schwarz, die Zwischenwand der Gehörorgane auch schwarz; alle Schenkel ohne Dornen; Dornen der Hinterschienen oben schwarz, unten spärlicher und heller; Pronotum nach hinten breiter als beim ♀ und mit einem leicht aufgebogenen, von einer etwas gebogenen Querrinne begrenzten, seicht eingedrückt punktierten Hinterlappen; Speculum der beiden Deckflügel sehr gross, hyalin; Deckflügel kürzer und breiter als beim ♀, erreichen die Spitze der Hinterflügel; Analsegment tief ausgerandet und mit abgerundeten Ecken; Cerci ziemlich dick und kurz, kreisrund, an der Spitze etwas verjüngt, mit je einem zugespitzten, von der Mitte der Innenseiten abstehenden, etwas gebogenen Dorn; Subgenitalplatte winkelig ausgeschnitten.

	♂	♀	
Länge des Pronotums	5	4,5	mm
» der Deckflügel	25	28	»
Grösste Breite der Deckflügel	7	5	»
Länge der Vorderschenkel	4,5	5	»
» » Vorderschienen	4,7	5,2	»

Länge der Mittelschenkel	5,4	6	mm
» » Mittelschienen	5	5,5	»
» » Hinterschenkel	17	19	»
» Hinterschienen	16	18	»
» Cerci	1,2	2	»
» » Legescheide		11	»

Fundort: Kamerun, 1 ♂, 2 ♀, 1 Larve ♀.

Xiphidium maculatum Le Gouill.

Xiphidium maculatum Le Gouillou; Brunner, l. c. p. 515.

Fundorte: Kamerun, 1 ♂, 4 ♀.
Kongo, (Ekblom) ♀.

Xiphidium æthiopicum (Thunb.).

Xiphidium æthiopicum Thunb.; Brunner, l. c. p. 517.

Fundorte: Bibundi, 18. Dec. 1890, ♀; Kamerun, ohne nähere Angaben 3 ♀, 8 Larven.

Hexacentrus dorsatus Redt.

Hexacentrus dorsatus Redtenbacher, Monographie l. c. p. 549.

Fundort: Ndian, 20. Juni 1891, ♀.

Fam. Hetrodidæ.

F. Karsch, Über die Hetrodiden, in: Berl. Ent. Zeitschr. XXXI, 1887, p. 43—72, Taf. II.

W. F. Kirby, Notes on the Family Hetrodidæ, with a List of the discribed Species, in: Ann. Mag. Nat. Hist. (7) III, 1899, p. 97—101 and 141—146.

Gen. Cosmoderus Lucas.

Cosmoderus Lucas, Ann. Soc. Ent. France (4) Tom. 8, 1868, p. 325, tab. 8.

Cosmoderus femoralis Sjöst. n. sp.

Horngelblich, oft etwas rötlich angehaucht; Hinterleib glatt, oben dunkler und oft deutlich bronzeglänsend; *Fühler* dunkelbraun und gelb geringelt, die dunklen Ringe nach aussen immer länger, die Basalglieder gelb; *Pronotum* entweder fast einfarbig, oder an der Seiten und oben in der Mitte dunkler; zwischen den Vorder- und Mitteldornen oben zwei kleine runde Flecke; der Rand des Pronotums ringsum gelb; die Dornen mit dunklerer äusserster Spitze, bisweilen rötlich, die vorderen und mittleren bisweilen dunkel: alle *Schenkel* mit runden schwarzen, kleinen Flecken, die jederseits mehr oder weniger deutlich in zwei nach aussen zusammenfliessenden Reihen stehen; alle *Schienen* oben und unten mit einem breiten, mehr oder weniger deutlich markierten Band, das sich nicht bis an die Unterseite erstreckt; gegen die Spitze der Hinterschenkel hin auch ein solches breites Band vorhanden; an den Hinterschienen die Bänder oben unterbrochen und auch an der Innenseite undeutlich; alle Schenkel, von den zwei grossen Enddornen abgesehen, oben unbedornt; das erste und zweite Paar unten am Aussenrand mit 2—3, am Innenrand mit 3, das dritte Paar mit resp. 3—6 und 2—4 Dornen, die letzteren sehr klein; Vorderschienen glatt, nur selten mit kleinen Dornen bewehrt, nach aussen ein wenig abgeplattet, nicht rinnenförmig, unten wie die Mittelschienen mit sechs Paar etwas eingebogenen Dornen, von denen die mittleren grösser sind; Mittel- und Hinterschienen oben am Aussen- und Innenrand bedornt; Hinterschienen unten am Aussenrand mit 9 Dornen, von denen die zwei äussersten sehr klein sind, am Innenrand mit kleineren Dornen, von denen die äusseren noch kleiner sind und dicht stehen.

Länge des Pronotums ohne Dornen	12—17	mm
Breite » » » »	9—13	»
Länge der Vorderschenkel mit Trochanter	10—16	»
» » Vorderschienen	10—16	»
» » Mittelschenkel	9—15	»
» » Mittelschienen	9—15	»
» » Hinterschenkel	12—20	»
» » Hinterschienen	13—23	»

Diese Art bildet ein Zwischenglied zwischen den Gattungen *Cosmoderus* LUCAS[1]) und *Aprophantia* KIRBY[2]). Sie unterscheidet sich von der ersteren durch das Fehlen von Dornen an der Oberseite der Schenkel, von den zwei grossen Dornen an der Spitze derselben abgesehen, von der anderen durch das Vorhandensein von Dornen an der Oberseite der Schienen der zwei letzten Beinpaare sowie auch bisweilen an den Vorderschienen. Ohne die Gattungsdiagnosen zu verändern, kann die vorliegende Art weder zu der einen, noch zu der anderen der genannten Gattungen gezählt werden, sondern es würde dieselbe als eine selbständige Gattung zu betrachten sein. Da sie indessen dasselbe typische Aussehen wie die Arten dieser Gattungen hat, kann ich die genannten Verschiedenheiten nur als Artencharaktere betrachten, weshalb ich die Arten dieser Gattungen alle zu einer Gattung, *Cosmoderus*, vereinige, welche Gattung also, was die Bewaffnung der Beine betrifft, variirend ist. Wie *Cosmoderus* (*Aprophantia*) *maculatus*, hat auch die vorliegende Art unbedeutend längre Beine als *C. erinacius*.

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[1] LUCAS, Ann. Soc. Ent. Fr. (4), Tom. 8, 1868, p. 325, tab. 8; vergl. THOMSON, Archives Ent. II. 1858. pl. IX, fig. 1, p. 260.

[2] KIRBY, Ann. Mag. Nat. Hist. (6) XVIII, 1896, p. 261, pl. XII, fig. 8.

War an den meisten Orten ziemlich allgemein und wurde im Buschwalde oft auf breitblätterigen Marantacéen angetroffen. Bewegt sich sehr langsam.

Fundorte: Bonge, Sept. u. Nov. 1891, Bibundi, Itoki, Bavo. 8 Ex. ♀ ♂. Kamerun (Lindow, 1890) 6 Ex. in Spiritus.

Cosmoderus maculatus (Kirby).

Aprophantia maculata Kirby, Ann. Mag. Nat. Hist. (6) vol. XVIII. 1896, p. 261, pl. XII, fig. 8.

Mit Ausnahme der zwei grossen, abstehenden Enddornen der Schenkel sind die Beine oben ganz ohne Dornen; unten sind sowohl die Schenkel, wie die Schienen mit zwei Reihen grosser Dornen bewehrt; die Dornen am Innenrand der Hinterschienen sind kleiner.

Fundort: Kamerun.

Übersicht der angeführten Arten.

Fam. **Phaneropteridæ.**

Seite
1 Stenamblyphyllum dilutum Karsch . . . . 5.
2 Arantia melanotus Sjöst. n. sp. . . . . 6.
3 » orthocnemis Karsch . . . . 8.
4 » latifolia Karsch . . . . 8.
5 Goëtia galbana Karsch . . . . 8.
6 Bongeia puncticollis Sjöst. n. g. n. sp. . . . . 9.
7 Itokiia silvarum Sjöst. n. g. n. sp. . . . . 10.
8 Dapanera genuteres Karsch . . . . 11.
9 Poreuomena forcipata Sjöst. n. sp. . . . . 12.
10 » africana Brunner . . . . 13.
11 Mangomaloba monticola Sjöst. n. g. n. sp. . . . . . 15.
12 Miltinobates blandus Sjöst. n. g. n. sp. . . . . . . 16.
13 Zeuneria melanopeza Karsch . . . . 17.
14 Gravenreuthia saturata Karsch . . . . 17.
15 Phaneroptera nana Charp. . . . . 18.
16 Tetraconcha fenestrata Karsch . . . . 19.
17 Dannfeltia nana Sjöst. n. g. n. sp. . . . . 19.
18 Eurycorypha montana Sjöst. n. sp. . . . . 20.

Fam. **Mecopodidæ**

19 Leproscirtus granulosus (Karsch) . . . . 22.
20 Apteroscirtus denudatus Karsch . . . . 22.
21 Acridoxena hewaniana White . . . . 23.
22 Anoedopoda erosa Karsch . . . . 24.
23 » lamellata (Linn.) . . . . 24.
24 Macroscirtus preussianus Karsch . . . . 24.
25 » acutipennis (Karsch) . . . . 24.
26 Corycus Jurinei Sauss. . . . . 25.
27 » abruptus Krauss . . . . 25.

Seite
28 Corycus siccifolium Sjöst. n. sp. . . . . 25.
29 » Karschi Krauss. . . . . 26.

Fam. **Pseudophyllidæ.**

Mustius Afzelii Stål.
30 Mustius superbus Sjöst. n. sp. . . . . 29.
31 » eurypterus Karsch . . . . 31.
32 Matæus guineensis (Bol.). . . . . 31.
33 Pleminia personata Sjöst. n. sp. . . . . 31.
34 Lichenochrus marmoratus Sjöst. n. sp. . . . . 32.
35 » maculosus Sjöst. n. sp. . . . . 34.
36 » flavifrons Sjöst. n. sp. . . . . 35.
37 Orchestridoptera rufipes Sjöst. n. g. n. sp. . . . . . 37.
38 Mormotus Montesi (Bol.). . . . . 37.
39 Semiophygas arescus Karsch . . . . 38.

Fam. **Conocephalidæ.**

40 Pseudorhynchus hastatus (Bol.). . . . . 39.
41 » nigrifrons Redt. . . . . 39.
42 Conocephalus mandibularis (Charp.). . . . . 39.
43 Xiphidium senegalense (Krauss). . . . . 40.
44 » maculatum Le Gouill. *. . . . . 41.
45 Hexacentrus dorsatus Redt. . . . . 41.

Fam. **Hetrodidæ.**

46 Cosmoderus femoralis Sjöst. n. sp. . . . . 41.
47 » maculatus (Kirby). . . . . 43.

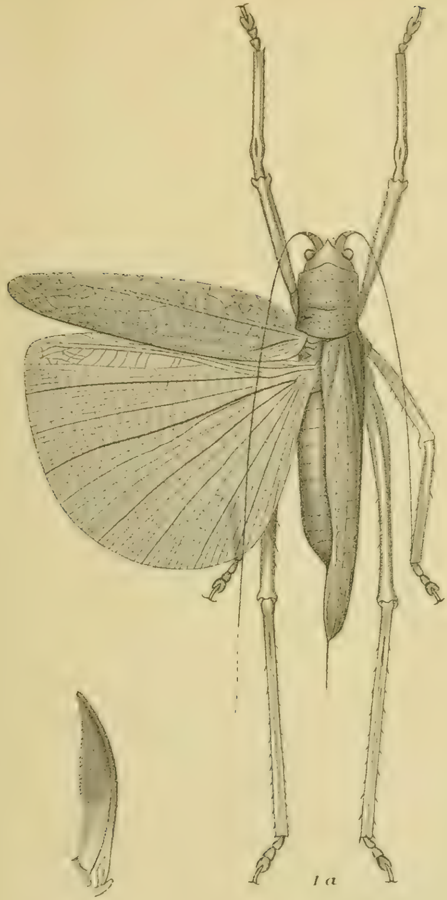
* *X. æthiopicum* (Thunb.) = 48 sp.

TAF. I.

Erklärung der Abbildungen.

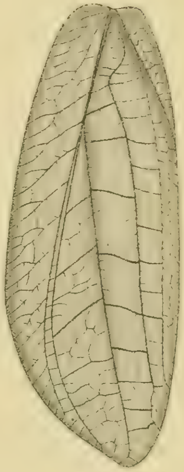
Taf. I.

Fig. 1 a. *Orchestridoptera rufipes* Sjöst., ♀ in nat. Grösse.
» 1 b. » » », Legescheide in nat. Grösse.
» 2. *Corycus siccifolium* Sjöst., ♀ in nat. Grösse.
» 3. *Mustius Afzelii* Stål, ♀, Deckflügel in nat. Grösse; nach der Type Ståls.



1 a

1 b



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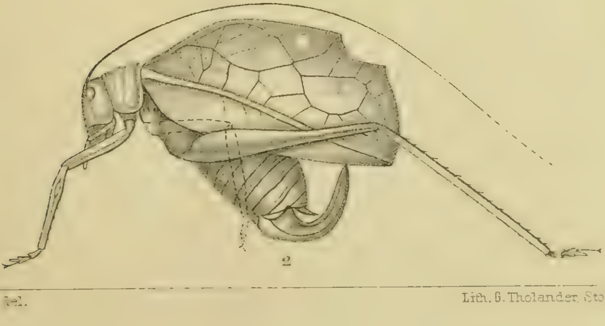

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Th. Ekblom del.

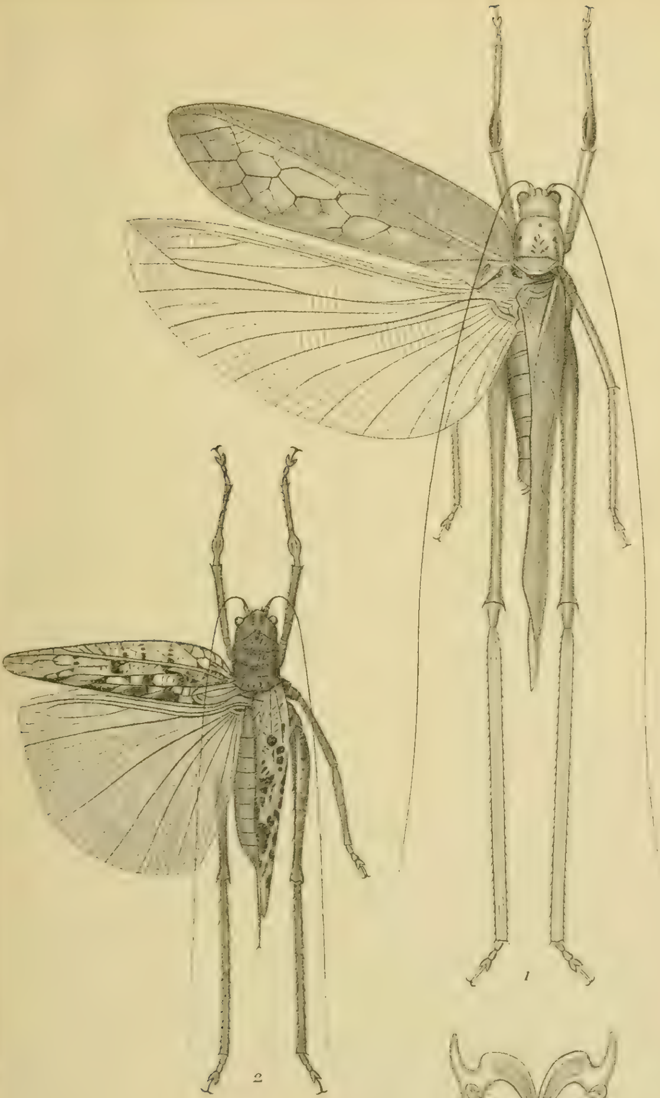
Lith. G. Tholander, Stockholm.

TAF. II.

Erklärung der Abbildungen.

Taf. II.

Fig. 1. *Arantia melanotus* Sjöst., ♂ in nat. Grösse; vergl. Taf. VI, Fig. 4.
» 2. *Lichenochrus maculosus* Sjöst., ♀ in nat. Grösse.
» 3. *Poreuomena forcipata* Sjöst., ♂, Analsegment, vergr.
» 4. » » » Cerci und Lamina subgenitalis, vergr.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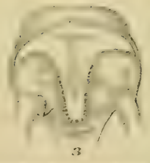
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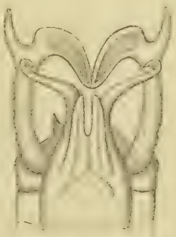
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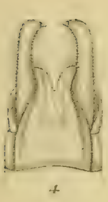
Th. Ekblom del.
Lith. G. Tholander, Stockholm.

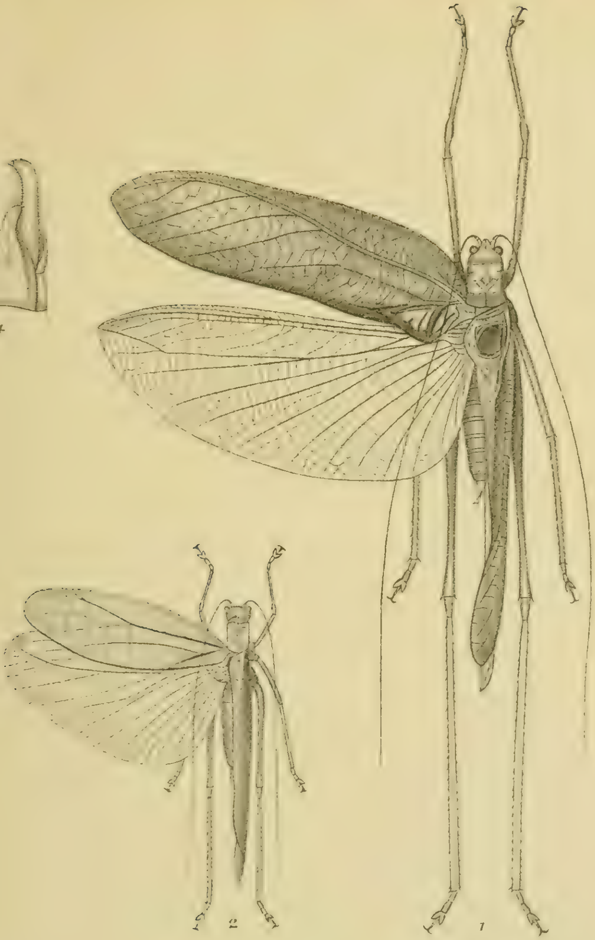
TAF. III.

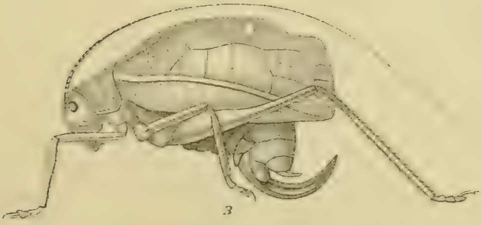
Erklärung der Abbildungen.

Taf. III.

Fig. 1. *Gravenreuthia saturata* Karsch. ♂ in nat. Grösse.
» 2. *Eurycorypha montana* Sjöst., ♀ in nat. Grösse.
» 3. *Corycus Karschi* Krauss, ♀ (adhuc ignota) in nat. Grösse.
» 4. *Mangomaloba monticola* Sjöst., Cerci und Lamina subgenitalis.







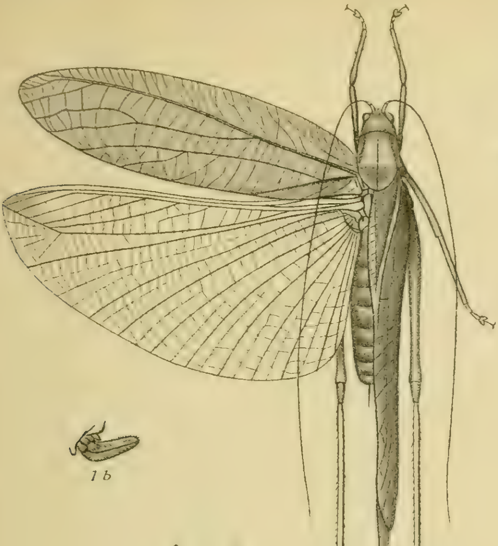
Th. Ekblom del.
Lith. G. Tholander, Stockholm.

Taf. IV.

Erklärung der Abbildungen.

Taf. IV.

Fig. 1 a. *Dapanera genuteres* Karsch, ♀ (adhuc ignota) in nat. Grösse.
» 1 b. *Dapanera genuteres* Karsch, Legescheide, vergr.
» 2. *Miltinobates blandus* Sjöst., ♂ in nat. Grösse.
» 3 a. *Bongeia puncticollis* Sjöst., ♀ in nat. Grösse.
» 3 b. » » » » Legescheide, vergr.
» 4. *Arantia melanotus* Sjöst., ♂ Cerci, vergr.; vergl. Taf. II, Fig. 1.
» 5. *Dannfeltia nana* Sjöst., ♂ in nat. Grösse.



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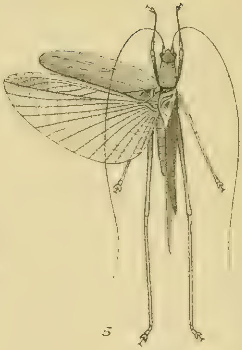

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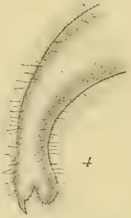
1 b



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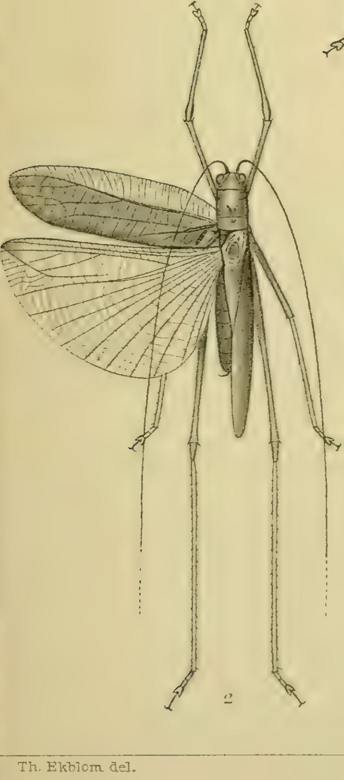

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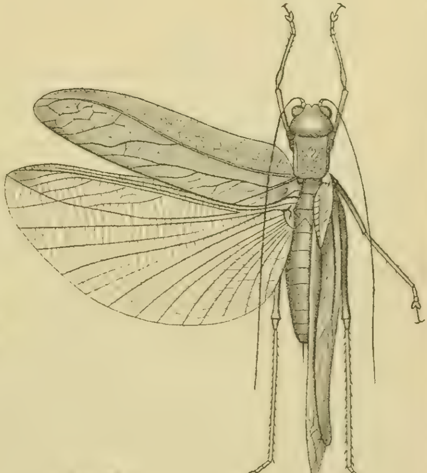
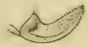


3 a



3 b

Th. Ekblom del. Lith. G. Tholander, Stockholm.

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 4.

ON

THE GENUS LYCODES

BY

F. A. SMITT.

II.

WITH 5 TABLES AND 1 PLATE.

PRESENTED TO THE R. SWEDISH ACADEMY OF SCIENCES, MARCH 13, 1901.

STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1901

In my last paper on this genus[1], when giving the result of my examination of the fishes from the NATHORST-expedition, I tried to show that hitherto a far too great weight had been given to the colour-differences as used for specific characters, thus asserting that such nominal species as f. i. *Lycodes frigidus* and *Lycodes pallidus* should be regarded only as colour-varieties, at least until true characters could be assigned to them. Now I have had the opportunity to examine the collection of these fishes brought home by the KOLTHOFF-expedition last year from Spitzbergen and Greenland, a relatively great number, which gives a more thorough knowledge of the forms and their changes.

It may be remembered that the author, who first treated this genus, REINHARDT sen., distinguished three species, *reticulatus*, *Vahlii* and *seminudus*, the last however, as he said, nearly related to the first. After REINHARDT the genus has been treated in many ways, and a new subgenus, *Lycenchelys*, has been created among our northern forms; but always among the true *Lycodes* the characters given by REINHARDT have been acknowledged as the most essential, either in distinguishing of more species or in grouping them together around the two standard ones *reticulatus* and *Vahlii*. These principal characters of the two species or resp. groups of species are to be found in the length of the head and the position of the anus; but in distinguishing the *seminudus* from the *reticulatus* REINHARDT also brought into consideration the distribution of the scales and the height of the body.[2]

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[1] Ann. Mag. Nat. Hist., ser. 7, vol. V, pag. 56.

[2] For the sake of brievety I have not here mentioned the other characters cited by REINHARDT. The colour-differences and the breadth of the head give no constant characters. The number of rays in the dorsal resp. anal fins goes along with the different position of the anus, in following the prolongation of the tail.

Now, in our studies of the Kolthoff-collection and the other specimens of *Lycodes*, preserved in the Royal Museum, numbering about 80 specimens, our results with some modifications are essentially the same as those presented by Reinhardt, and thus at first we may consider the mentioned characters.

In the same manner as when treating the patagonian Lycodoids,[1] I have measured 80 specimens, using the following designations:

a: total length of the body, expressed in millimeters,
b: length of the head,
b_1: » » » » reduced (without the operculum),
b_2: » » » cheek (from the back point of the maxillary to the hind margin of the preoperculum),
b_p: length of the postorbital part of the head,
lt_c: breadth of the head at the eyes,
lt_b: largest breadth of the head behind the eyes,
c: longitudinal diameter of the eyes,
e: length of the nose,
g: breadth of the interorbital space, without the membranous fold of the skin covering the upper part of the eyes,
g_1: breadth of the interorbital space together with the skin over the eyes,
h: length of the upper jaw,
k: » » » lower »
br: breadth (height) of the branchial aperture,
tr: length of the trunk, from the upper axil of the pectorals to the beginning of the anal fin,
m: distance from the point of the nose to the beginning of the dorsal fin,
n: length of the dorsal fin to the tip of the last (caudal) rays,
n_1: » » » » » » » » » » tail (without caudal rays),
o: length of the longest ray in the dorsal fin,
p: » » » pectoral fins, from the upper axil to the tip of the fin,
pb: breadth (height) of the base of the pectoral fins,
r: distance from the point of the nose to the base of the ventral fins,
r_1: distance from the point of the lower jaw to the base of the ventral fins,
s. length of the ventral fins,
t: distance from the base of the ventral fins to the beginning of the anal fin,

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[1] Bih. Vet. Akad. Handl., Bd 24, Afd. IV, N:o 5, p. 39.

u: distance from the point of the nose to the beginning of the anal fin,

u_1: distance from the point of the lower jaw to the beginning of the anal fin,

v: length of the anal fin to the tip of the last (caudal) rays,

v_1: length of the anal fin to the tip of the tail (without caudal rays),

x: length of the longest ray in the anal fin,

alt_p: height of the body at the pectoral fins,

alt_u: » » » » » » beginning of the anal fin,

alt_{uv}: » » » » » » middle of the length of the anal fin.

After the above-named principles, laid down by REINHARDT, I have divided the mass of specimens of *Lycodes* into six groups; and for these it is not difficult to find respective names, chosen from the mass of synonyms in this genus, although we may not expect to find any complete correspondence to the characters or descriptions given by the authors. The group of *Lycodes Vahlii* I have thus divided into the three forms: *gracilis*, *pallidus* and *Vahlii typicus*: the group of *Lycodes reticulatus* is divided into *frigidus*, *seminudus* and *reticulatus typicus*. To these in the tables of measurements are added two specimens of the *Lycodes* (*Lycenchelys*) *Verrillii*.

I: Length of the head (b).

From the tables of measurements in the first instance it is very easy to find, what however already is known, that the widest gap in the per-cent-numbers of the relation of the length of the head to that of the body lies between *Lycenchelys* and the true *Lycodes*. Still it is to be remembered, that according to GOODE and BEAN,[1] »the old males of *L. Verillii* are transformed almost beyond specific recognition by an extraordinary development of the entire head in advance of the eyes». Through this deformity and through the intervening »species» *L. Sarsii*,[2] the named gap is filled; but setting aside the abnormities, in the manner of development we find a more important difference between the two subgenera. With COLLETT, who has given the measurements of

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[1] *Oceanic Ichthyology*, p. 310, pl. LXXIX, fig. 277.

[2] Cfr. Ann., Mag. Nat. Hist., ser. 7., vol. V, p. 58.

4 specimens of *Lycodes (Lycenchelys) murænа*[1] as well as of 17 specimens of *L. Sarsii*,[2] we find that the relative length of the head in this subgenus is normally diminishing from the young to the old age; but in the true *Lycodes*, setting aside the larval stages (fry, with a length of the body less than 60 millimetres), we find that length of the head normally increasing with age. The two subgenera then seem to have started from the same origin, developing themselves in opposite ways.

As to the true *Lycodes*, between the cited 6 forms in the individual per-cent numbers we find no constant differences, but in the average-numbers (see Table IV) the figures are rather regularly increasing from the *Vahlii*-group to the *reticulatus*-group. Thus the former group seems to represent the lowest stages of development. The least figures we find in *Lycodes gracilis*; but it may perhaps be questioned, if that not be a consequence rather of degeneration (regressive development) than of originality. In the most instances the males have greater figures than the females; but this sexual difference is not constant, what will most easily be seen from the averages:

Averages	*gracilis*[3]		*pallidus*		*Vahlii*		*frigidus*		*semi-nudus*		*reticu-latus*	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
a: mm. . .	(140.2)	(144.5)	93.6	106.5	137.3	206.2	244.2	145.2	140.9	189.7	95.3	150.1
b_a % . . .	(19.9)	(19.7)	20.9	22.5	21.8	23.0	24.9	24.5	25.5	27.3	24.7	25.9

The different parts of the head (b_1; b_2; b_p; c; e; g; g_1; h; k; br, as well as lt_c and lt_b) present the same evolutional changes as well in the ontogenetic development as in the form-series, and that sometimes with such a regularity, that f. i. the specimens of *pallidus* may be divided in two groups, the younger ($a < 99$ mm.) with the upper jaw ($h_{/a}$ %) less than 9 % and the lower jaw (k_a %) less than 11 % of the length

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[1] Norsk. Nordh. Exped., Zool., Fiske, p. 119:

a (millim.) .	112	141	198	217
b/a % . . .	14.3	12.9	12.6	12.0

[2] Cfr. Ann., Mag. Nat. Hist., ser. 7, vol. V, p. 58.

[3] The figures in brackets are no true averages, because we have not more than two males and two females of this form.

of the body, while the more adult ones present higher percent-figures. In the same manner in the group of typical *reticulatus* at the length of the body of 120—130 mm., between the younger and older individuals there is a marked difference in the relative length of the upper jaw. In the formseries (see Table IV, $h_{,a}$ and $k_{,a}$) this onto-genetic progression is expressed by the almost unbroken series of increasing average-figures for the six forms, counted from *gracilis* to *reticulatus*. This being the case, when seeing these differences growing on with the natural development, we may not expect here-in to find any constant specific characters, as it rather seems probable that the respective forms are only different stages of development of one and the same species, but there are marked differences in the age, at which the one and the other form acquires the same degree of development. Thus f. i. the length of the nose (e) would give a constant character ($e_{,a}$ % < 6.3) for the *forma gracilis* (see Table II), if it not were that the larval stage ($a < 60$ mm.) of the typical *Vahlii* (Table II) as well as of *frigidus* (Table III) presents almost the same figures as those of *gracilis* when about 200 mm. long. Furthermore such a short nose ($e_{,a}$ % < 7) reappears as individual abnormities in the whole *Vahlii*-group.

With the changes of the length of the head follow in general the changes of the distances from the tip of the nose resp. to the beginning of the vertical fins (m and u) and to the ventral fins (r), the relative increase of the first-named length taking with it a corresponding increase of these distances. Thus we may not expect in these relations to find any constant characters for the different forms; but the above-named sexual difference (b ♂ $>$ b ♀), although not constant, takes a more palpable expression in the relation between the length of the head (b) and the distance from the tip of the nose to the beginning of the anal fin (u); thus in average:

	gracilis		*pallidus*		*Vahlii*		*frigidus*		*semi-nudus*		*reticu-latus*	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
a: mm. . .	(140.2)	(144.5)	93.6	106.5	137.3	206.2	244.2	145.2	140.9	189.7	95.3	150.1
$b_{,u}$ % . . .	(47.6)	(48.3)	49.6	51.8	52.8	56.0	51.9	52.2	51.2	55.0	51.5	52.3

Here it is of interest also to see, how evenly the figures for b_u % in the whole *Vahlii*-group (from *gracilis* to the typical *Vahlii*) are enlarging, in the first place owing to the evolutional law (b_u % juv. $<$ b_u % sen.) but with the figures for *gracilis*, although for a more advanced age, smaller than the others, in accordance with the above stated fact that this form represents the juvenile stages of the group as a whole.

II: **Position of the anal aperture** (u; u_1; v; v_1; tr).

The position of the anus itself is not given here directly, because with the looseness of the tissues it is often difficult to fix either the anterior rim or the centre of the aperture, but instead of this I have given the position of the beginning of the anal fin, what practically will give the same results.

As above quoted from REINHARDT, the two species or groups of forms of the northern *Lycodes* may be characterized by the resp. relations between the length of the fore-body (head and abdomen) and that of the tail (here measured from the beginning of the anal fin resp. to the tip of the tail-fin or of the tail itself). Now, in our tables of measurements, as the specimens are distributed into these two groups, if we set aside the larval specimens (with the total length less than 60 mm.), we find, that the lowest figure for the length of the fore-body in the *reticulatus*-group (Table III), measured from the tip of the nose, is 44.4 per cent of the total length ($^{u}/_{a}$ %), while in the *Vahlii*-group (Table II) the highest corresponding figure is 43.8. In the same manner that length of the fore-body measured from the tip of the lower jaw (u_1) in the *reticulatus*-group presents the lowest figure 42.4 and in the *Vahlii*-group the highest figure of 42.0 % of the total length ($^{u_1}/_{a}$ %). For the length of the tail these relations of course in general are reversed. If measured to the tip of the tail-fin, in the *reticulatus*-group the highest figure for this length is 56.2 %, while in the *Vahlii*-group the lowest figure is 56.1 % of the total length ($^{v}/_{a}$ %); and, if measured to the tip of the tail itself (without caudal fin), this length in the *reticulatus*-group (Table III) has the highest figure 53.8 %, in the *Vahlii* group (Table II) the lowest figure 54.3 % of the total length ($^{v_1}/_{a}$ %). These differences, no doubt, either are too small for giving specific characters, or, as we see for $^{v}/_{a}$ %, the figures overlap each other; and with the larval specimens taken into account, the differences between the two groups are farther evanescent, because then we see:

$^{u}/_{a}$ % in the *reticulatus*-group $\left\{\begin{array}{l} < 52.8 \\ > 43.2 \end{array}\right.$

» » » » *Vahlii*-group . . $\left\{\begin{array}{l} < 43.9 \\ > 38.1 \end{array}\right.$

$^{u_1}/_{a}$ » » » *reticulatus*-group $\left\{\begin{array}{l} < 49.9 \\ > 41.7 \end{array}\right.$

» » » » *Vahlii*-group . . $\left\{\begin{array}{l} < 42.7 \\ > 36.7 \end{array}\right.$

$^{v}/_{a}$ » » » *reticulatus*-group $\left\{\begin{array}{l} < 56.7 \\ > 48.9 \end{array}\right.$

» » » » *Vahlii*-group . . $\left\{\begin{array}{l} < 62.8 \\ > 55.7 \end{array}\right.$

$^{v_1}/_{a}$ » » » *reticulatus*-group $\left\{\begin{array}{l} < 53.9 \\ > 45.1 \end{array}\right.$

» » » » *Vahlii*-group . . $\left\{\begin{array}{l} < 59.7 \\ > 53.9. \end{array}\right.$

The auxological law (ontogenetic as well as phylogenetic) for the development is expressed by a steady progress in the figures for the relative length of the fore-body and a decrease in those for the length of the tail, as may be seen from the following table:

Averages	*gracilis*		*pallidus*		*Vahlii*		*frigidus*		*semi-nudus*		*reticu-latus*	
a: mm. . .	106.3	155.5	76.3	114.6	97.1	182.5	120.9	261.5	139.8	235.7	96.4	161.3
$^{u}/_{a}$ % . . .	40.5	41.1	40.9	43.5	40.3	41.5	45.6	48.6	49.6	49.9	47.3	50.1
$^{u_1}/_{a}$ % . . .	38.6	39.4	39.1	41.5	38.6	39.2	43.0	46.5	47.3	48.2	44.6	47.0
$^{v}/_{a}$ % . . .	60.4	59.7	58.8	57.1	59.7	59.3	55.4	53.7	50.3	50.7	52.6	50.5
$^{v_1}/_{a}$ % . . .	58.4	57.7	56.3	54.9	57.3	56.9	52.9	51.6	47.0	47.7	49.0	47.2
$^{u}/_{v}$ % . . .	67.0	68.8	69.6	76.2	67.5	70.0	82.3	90.5	98.6	98.3	90.0	99.2
$^{u_1}/_{v_1}$ % . . .	66.1	68.3	69.4	75.6	67.4	68.8	81.3	90.1	100.6	101.2	91.0	99.5

Here, indeed, in the last two lines ($^{u}/_{v}$ % and $^{u_1}/_{v_1}$ %) a truly constant character divides the two groups, as far as can be judged from our specimens; and the limit between their respective variablenesses seems to be fixed at 78 %, so that

$^{u}/_{v}$ % $\left\{ < 78 \right.$ characterizes the forms of the *Vahlii*-group,
$^{u_1}/_{v_1}$ % $\left\{ > 78 \right.$ » » » » » *reticulatus*-group.

By the same manner of reasoning one will find a constant character also in the relation between the length of the tail and that of the head. At first for the ontogenetic changes, in comparing the younger specimens with the older, we get the following averages:

Averages	*gracilis*		*pallidus*		*Vahlii*		*frigidus*		*seminudus*		*reticulatus*	
a: mm. . .	121.9	155.5	76.3	114.6	97.1	182.5	120.9	261.5	139.8	235.7	96.4	161.3
$^b/_r$ % . . .	30.8	32.3	35.7	39.1	36.7	38.2	42.9	47.3	51.9	53.3	47.5	52.0

Here we see that the figures for the younger specimens always are lower than those for the older (juv. < sen.), and that those for the *Vahlii*-group are lower than for the *reticulatus*-group. In auxological respect then, the former group may be regarded as the more primitive. The limit between the respective variations within the two groups, according to our specimens and measurements, is to be found at the figure of 41 %, so that

$^b/_r$ % { < 41 characterizes the forms of the *Vahlii*-group,
{ > 41 » » » » » *reticulatus*-group;

although the difference is so slight, that we have found the highest figure in the former group to be 40.8, while in the latter group the lowest figure has been 42.3.[1] In both groups there is one form (*gracilis*, resp. *frigidus*) representing the juvenile characters, in such a way that its figures are the lowest, although they belong to older specimens. Just the same we find in the examination of the external sexual differences with their evolutional changes:

Averages	*gracilis*		*pallidus*		*Vahlii*		*frigidus*		*seminudus*		*reticulatus*	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
a: mm. . .	(140.2)	(144.5)	93.6	106.5	137.3	206.2	244.2	145.2	140.9	189.7	95.3	150.1
$^b/_r$ % . . .	(33.0)	(32.5)	35.9	39.6	37.0	38.7	45.9	45.5	50.5	54.2	47.5	51.4

As here the males, in all the true averages, with due attention to the respective ages, have higher figures than the females, we have the final auxological result:

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[1] In a larval specimen 40.9.

juv. < sen.
♀ < ♂
Vahlii-group < *reticulatus*-group;

and the specific distinctness may be acknowledged, although, as we have seen, of very slight value; the one group having to be regarded as a farther advanced stage of the common development, with the masculine characters as leading the advancement.

All these differences in the position of the anal opening, we have seen, are depending on the length of the head; but there is of course another factor also determining that position, viz. the length of the trunk (abdomen, *tr* in our tables of measurements). A comparison of this length with the head gives the following result:

Averages	*gracilis*		*pallidus*		*Vahlii*		*frigidus*		*seminudus*		*reticulatus*	
a	106.3	155.5	76.3	114.6	97.1	182.5	120.9	261.5	139.8	235.7	96.4	161.3
tr/*h* % . . .	114.1	113.2	94.5	97.6	87.9	91.1	90.7	97.5	92.6	94.5	95.7	92.0

or

Averages	*gracilis*	*pallidus*	*Vahlii*	*frigidus*	*seminudus*	*reticulatus*
a	133.1	91.6	146.6	191.2	187.7	131.8
tr/*h* % . . .	113.6	95.7	89.7	94.1	93.6	93.7

Here we see that the above cited auxological law is broken, for in each group (excepting the two extremes *gracilis* and *reticulatus*) the respective forms have the per-cent-numbers of the young less than those of the older age (juv. < sen.), but the form-series of the *Vahlii*-group goes from the higher to the lower figures (*gracilis* > *pallidus* > *Vahlii*), and in the *reticulatus*-group the form-differentiation is almost none. In the first place this is a natural consequence of the sexual differentiation; for the females, as we have seen in all other respects, normally represent the juvenile stages, but here, for the shorter head, present higher per-cent-numbers, thus in average:

Averages	*gracilis*		*pallidus*		*Vahlii*		*frigidus*		*seminudus*		*reticulatus*	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
a . . .	(140.2)	(144.5)	93.6	106.5	137.3	206.2	244.2	145.2	140.9	189.7	95.3	150.1
$^{tr}/_{b}$ % . .	(112.9)	(105.4)	96.8	95.8	94.7	87.3	95.9	94.3	93.7	(88.8)	92.9	93.7

or

Averages	*gracilis*		*pallidus + Vahlii*		*frigidus*		*seminudus + reticulatus*	
	♀	♂	♀	♂	♀	♂	♀	♂
a	(140.2)	(144.5)	113.5	150.8	244.2	145.2	118.1	148.1
$^{tr}/_{b}$ % . .	(112.9)	(105.4)	96.7	91.6	95.9	94.3	95.0	92.6

Where it is evident, that the forms *gracilis* and *frigidus* in this respect rather represent the female characters, slipping away from their usual position as representatives of the juvenile stages.

Another result of greater interest is given by the comparison of the length of the trunk with that of the tail, as seen from the following statements:

Averages	*gracilis*		*pallidus*		*Vahlii*		*frigidus*		*seminudus*		*reticulatus*	
a	106.3	155.5	76.3	114.6	97.1	182.5	120.9	261.5	139.8	235.7	96.4	161.3
$^{tr}/_{v_1}$ % . . .	36.7	37.7	35.8	40.2	33.7	36.0	39.7	46.9	51.0	51.7	47.8	49.6

or

Averages	*gracilis*	*pallidus*	*Vahlii*	*frigidus*	*seminudus*	*reticulatus*
a	133.1	91.6	146.6	191.2	187.7	131.8
$^{tr}/_{v_1}$ % . . .	37.2	37.5	35.0	43.3	51.3	48.8

and

Averages	*gracilis*		*pallidus*		*Vahlii*		*frigidus*		*seminudus*		*reticulatus*	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
a . . .	(140.2)	(144.5)	93.6	106.5	137.3	206.2	244.2	145.2	140.9	189.7	95.3	150.1
$^{tr}/_{v_1}$ % .	(38.6)	(35.5)	36.9	48.3	36.0	35.1	44.9	43.4	51.1	(51.7)	46.2	50.1

or

Averages	*gracilis*		*pallidus* + *Vahlii*		*frigidus*		*seminudus* + *reticulatus*	
	♀	♂	♀	♂	♀	♂	♀	♂
a	(140.2)	(144.5)	113.5	150.8	244.2	145.2	118.1	118.1
$^{tr}/_{v_1}$ % . .	(38.6)	(35.5)	36.5	42.5	44.9	43.4	48.7	50.5

In all these respects we see, that *frigidus* comes nearest to the *Vahlii*-group — although in its older age it is here a complete *reticulatus* —; but the most interesting is to find two new facts: the sexual differentiation is the same for *gracilis* and *frigidus* (♀ > ♂) but another (♀ < ♂) for the rest; and among these latter, in the *Vahlii*-group the *pallidus* is the highest developmental stage, in the *reticulatus*-group the *siminudus* takes that same position.

These irregularities suggest the suppositions, that *frigidus* may be a hybrid, and that *pallidus* as well as *seminudus* may be in the beginning of differentiating themselves to distinct species resp. from *Vahlii* and from *reticulatus*.

III. Distribution of the scales.

This matter I have already treated in the »*Scandinavian Fishes*»,[1] with the result, that »the individual variations in this respect seem to be so great that we must abandon the attempt to base the determination of the species upon the presence or absence of scales; and no more reliance can be placed on the proposed determination based on the greater or less extent of the scaly covering in a forward direction, over the trunk and head, in those forms which are furnished with scales at an early age and retain them at all subsequent ages». Nevertheless it is a long-know-fact, cited by REINHARDT also, that the scaly covering in the *Vahlii*-group is not only more constant but also more extended both forward on the body and outward on the vertical fins. Herewith it follows, that the forms of the last-named group get their scales earlier in life than those of the *reticulatus*-group. The smallest specimen of *Lycodes reticulatus*, on which I have seen evident scales, is that numbered 26 in my tables of measurements, with a total length of 77 mm., while in the *Vahlii*-group already the specimen of *Lycodes gracilis* numbered 1, with a total length of 42 mm., is covered by scales, although thinly, on the midst of the sides of the body just before the beginning of the anal fin. However, the individual variation is very great, as shown by my remarks on the respective specimens in the measurement-tables.

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[1] pp. 608—609.

IV. **Height of the body.**

The scaly covering, as shown in the preceding paragraph, does not entitle any specific rank to *Lycodes seminudus*, as in that way defined by Reinhardt. Neither does the coloration give any better result, for, while our most specimens are rather pale, Reinhardt's type-specimen was uniform dark-brown (unicolor fuscus[1]). As to the dentition, which according to Lütken would give a constant character — series dentium palatinæ intermaxillares æquantes (*reticulatus*) l. intermaxillaribus longiores (*seminudus*) — this already once[2] has shown its futility as used for the distinction of the nominal species *Lycodes Esmarkii* from *Lycodes Vahlii;* and it seems to be the same case here. At first, if we consider the 20 specimens of the *reticulatus*-group, on which we have measured the length of the resp. lines of the palatine and intermaxillary teeth, we find

N:o	Total length, in mm.	Length of line of palatine teeth, in % of total length	Length of line of intermaxillary teeth, in % of total length	Sex.
26	77.0	4.0	4.0	♀
27	88.5	4.1	3.5	♂
28	88.8	5.2	3.6	♀
29	113.3	4.6	3.8	
30	114.5	5.0	3.6	♂
31	116.0	4.3	3.9	♂
32	120.0	3.7	4.0	♀
14	130.0	4.8	4.8	♂
33	134.0	5.2	4.5	♂

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[1] Lütken, Vid. Medd. Naturh. For. Kbhvn 1879—80, p. 331.

[2] Cfr. *Scandin. Fishes*, 2d edit., pp. 614 and 615.

N:o	Total length, in mm.	Length of line of palatine teeth, in % of total length	Length of line of intermaxillary teeth, in % of total length	Sex.
34	157.5	5.4	4.9	♂
15	161.0	5.1	5.6	♂
16	164.0	4.1	3.7	♀
17	182.2	5.0	5.8	
35	195.3	4.6	4.5	♂
18	196.7	4.9	5.4	♀
19	233.0	5.0	3.4(?)	
20	218.2	5.5	5.4	
36	245.0	5.7	4.6	♂
21	252.3	5.6	5.6	
22	278.1	4.6	5.3	♂

Here we have the averages:

	Total length, in mm.	Length of line of palatine teeth, in % of total length	Length of line of intermaxillary teeth, in % of total length
9 specimens $a < 150$ mm. .	109.1	4.5	4.0
11 specimens $a > 150$ mm. .	207.6	5.0	5.1

Thus we see, that both the two lines, in their resp. relations to the total length of the body, are growing longer with the increasing age, but the intermaxillary line in the highest degree, and this without any apparent sexual difference.

Now, if we divide the above-cited specimens in two groups, the one with the palatine line longest, the other with this line either as long as the intermaxillary or shorter, we have the averages:

	Total length, in mm.	Length of line of palatine teeth, in % of total length	Length of line of intermaxillary teeth, in % of total length
11 specimens . .	143.1	4.9	4.0
9 » . .	186.8	4.9	5.2

and here also we see, that the character alleged to *Lycodes seminudus* is bound with the younger specimens, while the older specimens would belong to the typical *reticulatus;* but it is to be noted, that just those specimens (N:o 31—34) which in their coloration and scaly covering come nearest to the type of REINHARDT'S *reticulatus*, would be referred to *seminudus*, as judged from the supposed teeth-character. The names therefore would rather be changed, the one for the other. This is the reason, why I cannot acknowledge the value af this character. But COLLETT, in his classical work on these fishes,[1] has distinguished two forms, characterised by the low body. The one, belonging to the *Vahlii*-group, he named *Lycodes pallidus*, the other, of the *reticulatus*-group, he identified with REINHARDT'S *Lyc. seminudus*. These I have tried to find again in our collection, with the result which will easily be seen already in my table of averages for the six primary forms (table IV). For all the respective heights — the greatest height of the body (usually at the anterior end of the trunk, alt_p), the height at the beginning of the anal fin (alt_u) and that at the midst of the base of the anal fin (alt_{uv}) — in the *Vahlii*-group the relative figures are less for the *pallidus* than for the typical form, just as in the *reticulatus*-group the figures for *seminudus* are less than those for the true *reticulatus*. In the former group, however, this may possibly be explained as a consequence of the evolutional changes, for the specimens of *pallidus* in averages are considerably smaller than those of the true *Vahlii*, and a single glance at the primary figures (table II) will show that these relative figures $\left({}^{alt_p}/_{a}\ \%,\ {}^{alt_u}/_{a}\ \% \text{ and } {}^{alt_{uv}}/_{a}\ \%\right)$ are increasing with age. Besides, there are no constant characters in these respects, for the maxima and minima are as follows:

	pallidus		*Vahlii*		*seminudus*		*reticulatus*	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
${}^{alt_p}/_{a}\ \%$ . . .	8.9	11.2	9.7	12.5	10.9	12.8	11.7(11.3)	16.6
${}^{alt_u}/_{a}\ \%$ . . .	7.1	9.7	8.4	11.7	8.9	10.3	10.2(8.9)	12.5
${}^{alt_{ur}}/_{a}\ \%$ . . .	5.1	6.8	5.2	7.4	6.2	7.4	6.8(6.5)	7.8

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[1] *Norw. N. Atlant. Exped. 1876—78, Zool., Fish.*, pp. 110 and 113.

It is thus necessary to find another proof of the significance of the averages, and the most instructive that I have found is derived from the relation between the height of the body at the beginning of the anal fin and the distance of this fin from the tip of the lower jaw $\left({}^{alt_u}\!/_{u_1}\ \%\right)$. There it will be seen (table V), that the forms named *pallidus* and *seminudus* always take lower figures than *Vahlii* and *reticulatus* respectively, at the corresponding age (as far as age can be judged from the length of the body); and for *seminudus* indeed in this relation there seems to be a constant character, distinguishing it from *reticulatus*, as its highest limit of variation is below 22 %, what in *reticulatus* occurs only in the larval state ($a < 60$ mm). This character, however, seems to be due to a divergency of the manner of evolution or, perhaps rather, to its interruption for *seminudus*, as will be seen from the following averages:

	pallidus		*Vahlii*			*seminudus*		*reticulatus*	
a, in mm. .	80.4	122.4	91.4	144.4	218.4	140.4	235.7	98.0	170.4
${}^{alt_u}\!/_{u_1}$ % . .	19.1	21.5	24.2	26.4	27.7	20.5	19.7	23.5	23.8

Here for *pallidus* and *Vahlii* the figures evidently are increasing with age, for *reticulatus* this increment is rather small (if a real one), but for *seminudus* the figures are a little decreasing from the younger to the older age, perhaps the beginning of a specific divergence, if it not at last, with a fuller material for examination, should turn out to be more properly regarded as the retention of a juvenile character, in which case *seminudus* in this respect would hold the same position to *reticulatus*, as does *frigidus* in other respects.

A few words may be added about a character, to which many authors have given a great weight. It is well known that in the *Vahlii*-group as well as in the *frigidus*-form the most conspicuous lateral line is the ventral one, while in the *reticulatus*-group the median lateral line appears in this character. But besides, in the former group usually at least traces of a median lateral line may be seen, just as in the *reticulatus*-group a dorsal line may be added to the median one. Now it happens also, that sometimes (see f. i. in N:o V. 34 in our tables of measurements) all the three lines are present, although, as far as we have seen, in a rudimentary state, with the scattered pores visible only as small, white dots. Very often, most frequently in old specimens, and always in the youngest, the lines are indistinct, in such a degree that they scarcely may be perceived, thus making the cited character useless. It is a very ambiguous character, but may sometimes be used as a supplementary one; and as it unites the *frigidus*-form with the *Vahlii*-group, although that form in other respects is a true *reticulatus*, it will strengthen the above made supposition that hybridism has played its part in the origination of the *frigidus*-form.

Lately (1898[1]) it has been suggested that one of the most striking characters would be derived from the breadth of the pectoral fins. This we have tried to prove by measuring the height of the base of these fins (*pb*), which in our specimens we have found variable enough, from about $4^{1}/_{3}$ or 4 to $7^{1}/_{2}$ or $7^{2}/_{3}$ per cent of the total length of the body, thus very well suggesting the probability of its giving place even to any specific distinction. But the figures, as may be seen already from our tables of primary per cent figures (tables II and III), are very irregular, although within the respective groups increasing in the main with the age of the specimens, what in the average-table (table IV) is expressed also by their steady increasing in the form-series from *gracilis* to *reticulatus*. As in the first-named table they cross over each other, from the one form to the other, they can not give us any constant characters for the respective forms; but their auxological changes through their regularity in the averages give us a new proof of the correctness of our views of the natural relations between the species, forms and varieties.

This will be still more evident by comparing the breadth of the base of the pectoral fins with another part of the body, as f. i. the length of the tail.

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[1] Jordan and Evermann, Fish. North a. Mid. America, p. 2462, note.

Averages	*gracilis*			*pallidus*				*Vahlii*		
a, in mm. . . .	125.7	142.1	158.4	70.1	87.1	91.1	122.4	104.4	146.6	188.8
$p^b/_v$ %	8.1	8.1	8.1	9.9	9.6	9.8	9.9	9.7	9.7	9.7
Maxima and minima for the specimens above . .	Min.	—	Max.	Min.	—	—	Max.	Min.	—	Max.
a, in mm. . . .	108.5	—	196.0	66.5	—	—	155.0	65.0	—	319.2
$p^b/_v$ %	7.4	—	9.1	9.3	—	—	10.2	8.6	—	11.3

Averages	*frigidus*			*seminudus*			*reticulatus*			
a, in mm. . . .	120.9	191.2	261.5	139.8	187.7	235.7	91.9	121.1	131.8	199.3
$p^b/_v$ %	11.0	11.5	12.0	12.6	12.3	11.9	12.3	13.2	13.4	15.0
Maxima and minima for the specimens above . .	Min.	—	Max.	Min.	—	Max.	Min.	—	—	Max.
a, in mm. . . .	96.7	—	357.8	62.0	—	278.1	77.0	—	—	245.0
$p^b/_v$ %	10.3	—	13.2	10.6	—	13.7	11.6	—	—	15.5

Here, if we choose the per cent number for these averagespecimens which are most like each-other in the size of the body, we find, for instance

	gracilis	*pallidus*	*Vahlii*	*frigidus*	*seminudus*	*reticulatus*
a	125.7	122.4	104.4	191.2	187.7	199.3
$p^b/_v$ % . .	8.1	9.9	9.7	11.5	12.3	15.0

A rather wide gap here divides the *Vahlii*-group from the *reticulatus*-group, but only in the averages. The *forma gracilis* is well divided from the *pallidus*-form, but not from the typical *Vahlii*, which as to the grade of development holds a lower position than *pallidus*. The *frigidus*-form has almost the same maxima and minima as *seminudus*, and the resp. maxima of these two forms exceed the minima of the typical *reticulatus*. Thus here are no constant characters to be found, but the evolution goes on with the form-series, and it is first in the typical *reticulatus* that we find the character, which by Collett was assigned to *Lycodes Lütkenii.*[1]

After this examination of the most principal characters, it may well be conceded, that among our true *Lycodes* the distinction of species is very vague. It seems rather as if the species still were in a state of developing themselves. In the larval and in the young postlarval stages they are rather impossible to distinguish from each other, but the individual varieties seem to leave a great field for the working up of more stabile differences. Such a difference, constant enough, although of no considerable magnitude, we have ascertained between the resp. limits of variation in the old Reinhardtian species *Vahlii* and *reticulatus.* As the natural factors for their differentiating themselves from each other, in connection with the evolutional force, in many instances we have seen the feminine characters leading the way of differentiation to *Lycodes Vahlii*, the masculine characters leading to *Lycodes reticulatus.* Within the limits of the former species it is easy enough to distinguish a local form, *gracilis*, living in the more southerly localities on the european side of the Atlantic, corresponding to the *zoarchus*-form on the american side, and perhaps by this geographical selection from the true home of the genus stopped in the evolution and retaining the juvenile characters. Again within the limits of variation of *reticulatus*, a special form, *frigidus*, may have been originated, perhaps by hybridisation, in the arctic home common for the two species. The resp. differences between *pallidus* and *Vahlii* and between *seminudus* and *reticulatus* are of still less value or constancy: they may rather be regarded as elongated varieties, with indications of a farther differentiation, that may perhaps lead to the origin of distinct species.

We thus arrange the forms:

A: Length of the head more than 41 per cent of the length of the tail.
a: Median lateral line most conspicuous.
α: Height of the body at the beginning of the anal fin usually more than 22 per cent of the distance of this fin from the tip of the lower jaw . . . . *Lycodes reticulatus.*

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[1] Norsk Nordh. Exped. 1876—78, Zool., Fiske, p. 103.

- *β:* Height of the body at the beginning of the anal fin usually less than 22 per cent of the distance of this fin from the tip of the lower jaw . . . . . *Lycodes seminudus.*
- *b:* Ventral lateral line most conspicuous . . *Lycodes frigidus.*

B: Length of the head less than 41 but more than 29 per cent of the length of the tail.
- *a:* Length of the head usually more than 33 per cent of the length of the tail.
  - *α:* Heigth of the body at the beginning of the anal fin usually more than 22 per cent of the distance of this fin from the tip of the lower jaw . . . *Lycodes Vahlii.*
  - *β:* Height of the body at the beginning of the anal fin usually less than 22 per cent of the distance of this fin from the tip of the lower jaw . . . *Lycodes pallidus.*
- *b:* Length of the head usually less than 33 per cent of the length of the tail . . . *Lycodes gracilis.*

C: Length of the head less than 29 per cent of the length of the tail.
- *a:* Distance of the dorsal fin from the tip of the nose more than 22 per cent of the length of the body . . . . *Lycodes Sarsii.*
- *b:* Distance of the dorsal fin from the tip of the nose (in normal specimens) less than 22 per cent of the length of the body.
  - *α:* Height of the body at the base of the pectorals more than 5 per cent of the total length (with caudal fin) . . . . *Lycodes Verrillii.*
  - *β:* Height of the body less than 5 per cent of the total length . . . . . *Lycodes muræna.*

Remarks on the specimens in the tables of measurements.

TABLE I.

N:o 1 and 2: *Lycodes Verrillii*, two males from the arctic sea east off Greenland, 72° 25′ N. lat., 17° 56′ W. long.; depth 300 meters; stone and sand; July 30, 1900, KOLTHOFF-expedition. Two lateral lines, viz. a ventral and a median one, the latter with scattered white pores, each with a longitudinal white streak from the front and at the back. These pores as usually are smaller than the white scales and most distinct in the dark (red-brown) patches of the body; — cfr fig. 1.

TABLE II.

Lycodes Vahlii.

1—11, forma *gracilis*.

N:o V. 1. Bahusia, Gullmar-firth, at Essvik, June 18, 1894, with trawl. Compared with the N:o 27 below (the arctic form of *Lycodes Vahlii*) this specimen is much more elongated. The livery of fry has its characteristic saddle-marks, red dorsal cross-bands, edged by brown, divided by the ligther colour of the body. The two foremost of the dark saddlemarks belong to the upper side of the head, divided by a strait, light crossband over the occiput, on a level with the hind preopercular margin. The second light dorsal crossband is on a level with the hind opercular margin. Then follow two dark saddle-marks, belonging to the abdomen and distinguishing themselves by their cross-bands in the dorsal fin more intensely dark than all the other marks. Behind these there are 9 dark saddle-marks, which all would belong to the tail, if not the anal opening (exceptionally?) were placed below the midst of the first mark. The tip of the caudal fin is white. In comparing this specimen with the corresponding figure in COLLETT (Vid. Selsk. Skr., I, M. N. Kl. 1899, N:o 6, pl. I, fig. 1) one will find the body more elongated and the anal opening otherwise situated.

Scattered scales on the sides of the body just in front of the beginning of the anal fin.

N:o V. 2. Bahusia, Gullmar-firth, biological station of Kristineberg, 1893. The livery of the fry is lost, except the two above-named dark crossbands in the front part of the dorsal fin (now specks as rests left of the abdominal saddlemarks) and the confused rests of the caudal saddle-marks, which give a black margin to the hind parts resp. of the dorsal and anal fins. No dark spots on the sides of the body. Anal opening placed below the second dark spot of the dorsal fin. Scales on the body well developed; only the head with nape and the livid belly without scales.

N:o V. 3. Same locality as N:o V. 1. Pale red, paler than the preceding specimen, the marks of the fry-livery resting very faint, as f. i. a light crossband on the nape and some pigment in the hindmost part of the vertical fins. Scaly covering as in the preceding specimen. Belly light. Hind margin of the pectorals, as usually in *Lycodes Vahlii*, incised, the 7th and 8th rays (counted from below) being almost like to each other and to the 6th but shorter than the 9th.

N:o V. 4. Locality, colour and scaly covering as in the preceding specimen. Pectorals scarcely incised.

N:o V. 5. Bahusia, Essvik, at the end of August 1900, with trawl. Colour as in COLLETT, l. c., fig. 6, with a line of dark spots in the middle of the sides of the body.

N:o V. 6. Same locality as N:o V. 1. Colour as in COLLETT, l. c., fig. 9, without dark spots on the sides of the body.

N:o V. 7. Same locality as N:o V. 5. Marks from the fry-livery rather conspicuous. Anal opening below the interspace between the second dark spot in the dorsal fin and the first dark caudal saddle-mark. 8 such marks on the tail (the 9th forming a spot on the tip of the caudal fin), the two first ending below just under the midst of the sides of the body but there combined through a network of irregular dark (brown) streaks, the other saddle-marks less or more completely extended on the anal fin. A row of six dark (brown) spots in the middle line of the sides of the body, each spot more or less regularly placed in the lower parts resp. of the abdominal and the foremost caudal dark saddle-marks. Incision in the pectorals rather inconspicuous.

N:o V. 8. Bahusia, Börsås, 1889, Dr CARL AURIVILLIUS. Pale red; fry-livery vanished. Spots in the front part of the dorsal fin rather inconspicuous. Other fry-marks visible only as forming a dark shading in the margin and hind parts resp. of the dorsal and anal fin. No spots on the sides of the body. Specimen crooked, measurements thus rather uncertain.

N:o V. 9. Bahusia, Firth of Saltkälla, August 1894, AURIVILLIUS. Specimen crooked, with the mouth and branchial apparatus in the highest degree expanded; measurements thus uncertain. Colour pale red, still lighter (yellowich white) on the ventral side. No spots in the front part of the dorsal fin. Irregular thin spots on the sides of the body.

N:o V. 10. Same locality as N:o V. 5. Pale red, light yellow below, with the median line of the belly livid. Only one dark spot in the front part of the dorsal fin, but faint rests of the caudal saddle-marks. An irregular, dark, longitudinal band in the midst of the sides of the abdomen. Dark spot on the opercle. Anal opening surrounded by yellowish white.

N:o V. 11. Same locality as N:o V. 5. Pale grey-red. 9 caudal saddle-marks (10, if the dark tip of the caudal fin be counted) rests from the fry-livery conspicuous enough, but narrow, a little enlarged below, with the centre of this part lighter. Vertical fins for the most part blue-grey. Belly (for the translucent peritioneal membrane) livid. Pectorals light-edged.

12—26, forma *pallida*.

N:o V. 12. Greenland, Mackenzie-bay, N. of Franz-Joseph-firth, August 1—3, 1900; depth 12—35 m.; mud-bottom; KOLTHOFF-expedition.

White, with grey, brown-edged figures. Caudal crossmarks 9, viz. 2 saddle-marks and 7 crossbands, the latter narrower than the white interspaces, the hindmost placed on the tip of the caudal fin. Back part of the anal fin brown-edged. Belly livid. Anal opening surrounded by white, placed below the interspace between the second abdominal and the first caudal saddle-mark. Scaly covering reaching from a little behind the beginning of the anal fin to the hind tip of the body.

N:o V. 13. Greenland, Franz-Joseph-firth; 73° 15′ n; 25° 42′ w.; depth 760 m.; mud bottom with sand, gravel and stones; August 14, 1899; NATHORST-expedition.

Colour reddish dark, compare fig. 19 in COLLETT, l. c. (young *Lycodes Esmarkii*). Head and belly livid. Saddle-marks (some of them probably a result of fusing together, two and two) transformed to broad crossbands, 7 behind the head, divided by six rather narrow white interspaces. Tail-fin white. Anal opening below the midst of the second dark crossband. Besides to be compared with N:o V. 29 below. Scales well developed on tail and abdomen, both above and below the middle line of the sides of the body, but head and belly naked. On the crown of the head a large fontanelle, through which whole the brain may be seen.

N:o V. 14. Same locality as N:o V. 12.

Colour light, with livid belly. Caudal crossmarks 9, the first four not descending over the anal fin, the fifth just doing so, the sixth and seventh crossing it completely, the eight also but having lost its hind margin, the ninth forming a crossband on the base of the caudal fin, whose tip is uncoloured. The white anal opening below the midst of the first caudal saddle-mark. No scales, but marks of a median as well as a ventral lateral line.

N:o V. 15. Same locality as N:o V. 12.

Colour intermediate between the ligth (N:os V. 12 and V. 14) and dark (N:o V. 13) varieties. Caudal crossmarks (resp. saddle-marks and crossbands) 7, the two first not descending to the anal fin, the third just doing so, the fourth, fifth, sixth and seventh in the anal fin conjoinded to a black, narrowly white-edged band, leaving the tip of the caudal fin as well as the hindmost part of the dorsal fin white. Anal opening below the interspace between the second abdominal and the first caudal saddle-mark, which marks however are partially united below (in the middle of the height of the body) by a streak of dark pigment. Belly livid. The nuchal light crossband abrupt in the middle of the neck. Iris silvery in front and behind. Scales on the dorsal (none on the ventral) part of the sides of the body from a little behind the base of the pectorals to the back margin of the third caudal saddle-mark. Median lateral line rudimentary, ventral line more conspicuous. Back margin of pectorals a little incised, the 7th—9th rays (from below) scarcely longer than the 6th.

N:o V. 16. Greenland, Franz-Joseph-firth, at the bottom of Musk-ox-bay; depth 100 m.; clay-bottom; August 17, 1900; KOLTHOFF-expedition.

Specimen crooked, with the mouth and gill-apparatus in the highest degree expanded; measurements thus uncertain. Colour and scales as in the preceding N:o but the nuchal light crossband continuous.

N:o V. 17. Same locality as N:o V. 12.

Colour almost the same as in N:o V. 14. Scales as in the preceding N:o (V. 16).

N:o V. 18. Same locality as N:o V. 12. Specimen crooked etc. as N:o V. 16.

Colour of the body pale. Caudal crossmarks (probably through confluence) reduced to 6. Tip of caudal fin white. Belly livid. Scaly covering as in the preceding, a little more extended below in front.

N:o V. 19. Same locality as N:o V. 12.

Colour pale. Caudal crossmarks 7 (or 8, if the black tip of the caudal fin be counted). Scales as in the preceding. A rudimentary median lateral line.

N:o V. 20. Same locality as N:o V. 12. Colour as in the preceding, but tip of caudal fin white. Scales as in the preceding. Back margin of pectoral fins feebly incised.

N:o V. 21. Greenland, off Mackenzie-bay, N. of Franz-Joseph-firth; depth 100 m.; mud-bottom, August 24, 1900; KOLTHOFF-expedition.

Specimen in the same bad condition as N:o V. 18. Caudal crossmarks 6 (7, if the black tip of the caudal fin be counted). Scaly covering extended below the middle line of the sides of the tail and abdomen. The naked belly blue in its middle line and higher up on the sides, but there-between white.

N:o V. 22. Same locality as N:o V. 12.

Colour as in the preceding, moreover resembling the figs. 5 and 6 in COLLETT, l. c. (*Lycodes gracilis*). Opercular spot conspicuous but ill defined. Caudal crossmarks 6, besides a black-brown spot on the caudal tip of the body. Scales as in the preceding. The naked belly livid.

N:o V. 23. Same locality as N:o V. 12.

Colour almost completely as in the preceding, but still paler. Scales below the middle line of the sides of the body scarcely perceptible but in the front of the abdomen, above the ventral lateral line.

N:o V. 24. Same locality as N:o V. 12.

Colour pale, as in the preceding, but retaining more of the fry-livery characteristics. Caudal crossmarks 9; tip of caudal fin white. Opercular spot indistinct. Scales almost as in N:o V. 21; head with nape, the livid belly, a streak along the base of the anal fin and the hindmost part of the body naked.

N:o V. 25. Same locality as N:o V. 12.

Dark variety, with the white interspaces forming more or less drop-like saddle-marks in the dorsal fin and the upper part of the sides of the body, but on the tail indistinctly descending to the anal fin. 6 complete and 1 incomplete (in the dorsal fin defective) caudal dark crossmarks, lighter in the centre above, together with a brown tip of the caudal fin. Nuchal light cross-band broadly abrupt on the neck. Opercular dark spot distinct. Head, as usually, light, almost white below; its upper side with the dorsal colour. Branchiostegal membrane livid, with white margin. Belly pale livid. Scaly covering almost complete on the body, but the head with nape, belly and the hindmost part of the tail naked. Incision in the hind margin of the pectoral fins rather feeble.

N:o V. 26. Greenland, mouth of Franz-Joseph-firth; depth 200—300 m.; mud-bottom; August 14, 1900; KOLTHOFF-expedition.

Colour reddish and yellowish. Nuchal light crossband (between the upper angles of the branchial apertures) almost unbroken. 6 complete caudal dark crossmarks, of which the two hindmost are reduced to crossbands; the 7th crossmark defective in the dorsal fin and represented only by a lump of brown pigment-spot in the anal margin of the body; the 8th represented by a brown pigment-spot on the caudal fin, whose tip however is light. Anal fin brown, reddish in front, almost black behind; with light margin. Opercular spot confluent with the brown (but light-edged) branchiostegal membrane. Anal opening below the front margin of the first caudal dark saddle-mark. Back margin of pectoral fins feebly incised. This specimen to be compared with N:o V. 38, below.

27—42, forma *Vahlii typica.*

N:o V. 27. Baffin-bay; 71° 42′ n., 73′ w.; depth 15—30 m.; sand with stones; September 28, 1894; Forrester E. NILSSON.

Light yellow, with reddish brown markings. Upper side of the head coloured as a saddle-mark, enclosing the upper half part of the eyes. Nuchal light crossband arched fore-over from the one to the other pectoral fin. Of the two abdominal dark saddle-marks, the first reaches the dorsal fin only with the tip of its hind, brown margin. Caudal saddlemarks 4, of which however the third evidently is composed of two yet undivided, what perhaps may be said of the fourth also. The second on the contrary is very narrow, contracted below and prolonged to a crossband over the anal fin also, in the same manner as the hind part of the third saddle-mark. The fourth saddle-mark forms a broad crossband (narrow below) over tail and fins. Tip of the tail and caudal fin light. Anal opening below the fore part of first caudal saddle-mark. No scales.

N:o V. 28. Baffin-bay; 71 57′ n., 73° 56′ w.; depth 9—36 m.; muddy bottom, off the mouth of a river; September 13—15, 1894; NILSSON.

Colour as in the preceding. Nuchal light crossband angular, V-formed. Caudal saddle-marks 4; on the right side, the first three continuous, the front part of the third downwards prolonged to a crossband over the anal fin, the fourth as in the preceding specimen; on the left side, all the marks separated and the middle parts resp. of the second and the third downwards prolonged as above. Anal opening below the dividing line between the second abdominal and the first caudal saddle-mark. No scales.

N:o V. 29. Same locality as N:o V. 26.

Colour white, figured with reddish grey (dark variety); otherwise as in the preceding, but the whole of the eyes included in the colour of the upper side of the head, and the tip of the tail with the caudal fin (except the hindmost point) occupied by a fifth dark crossband. Scales on the upper part of the sides of the abdomen. Anal opening below the front part of the second abdominal saddle-mark. Belly livid. Lateral line ventral.

N:o V. 30. Same locality as N:o V. 12.

Coloration almost the same as in N:o V. 15, the 7th caudal dark crossband evidently composed of two (united in the anal fin), of which the hindmost is defective in the dorsal fin. Tip of the tail together with the caudal fin white. Hind margin of the pectoral fins feebly incised. Scales on the upper parts of the abdominal and caudal sides of the body. Lateral line ventral, but rudimentary signs of the median as well as of a dorsal line.

N:o V. 31. Same locality as N:o V. 16.

Colour about the same as in N:o V. 19, but still paler, with only 5 caudal dark crossmarks, and with the anal opening placed below the hind margin of the second abdominal saddle-mark. Tip of tail together with caudal fin light. Hind part of the anal fin black-brown but light-edged. Scales as in the preceding specimen.

N:o V. 32. Same locality as N:o V. 13.

Colour reddish; the crossmarks on the body almost evanished but in the dorsal fin sharply defined and dark, 5 in the caudal part of that fin together with a faint sign of a 6th caudal band, more conspicuous in the anal fin. Tip of the tail with caudal fin light. Hind part of the anal fin and the branchiostegal membrane black-brown; belly livid. Anal aperture white, placed below the interspace between the second abdominal and the first caudal cross-marks. Scales on the whole body, except head and belly. Lateral line ventral.

N:o V. 33. Greenland, off Franz-Joseph-firth, between Bontekoe-island and Mackenzie-bay, depth 250 m.; mud-bottom; August 8, 1900; KOLTHOFF-expedition.

Colour almost the same as in N:o V. 25, but paler, with the white crossbands broader. Caudal dark crossmarks 6; hindmost part of the dorsal fin white, caudal faintly dusk; anal black-brown from behind forward about to below the hind margin of the second caudal saddle-mark, in front lighter. Belly and branchiostegal membrane livid. Scaly covering complete to below the last dorsal crossband. Head with nape and belly naked. Lateral lines ventral and dorsal, the latter thin but reaching at least to the second caudal dark crossmark.

N:o V. 34. Same locality as N:o V. 13.

Colour reddish grey, intermediate between the dark and light varieties, but with belly and sides of the head dark livid. Caudal dark crossmarks 6, but the hindmost defective (only faintly marked) in the dorsal fin, whose end together with the caudal fin is white. Scaly covering complete on the body, but the head with nape and belly as well as the hindmost part of the tail naked. Fins (as before) naked. Lateral lines ventral, median and dorsal.

N:o V. 35. Same locality as N:o V. 26.

Dark variety, else the colour as in the preceding specimen. Caudal crossmarks 8, else as remarked in the preceding. Scales and lateral lines as in the preceding. Fins (as before) naked. Hind margin of pectoral fins feebly incised. Anal fin rather light livid.

N:o V. 36. Same locality as N:o V. 33.

Colour on the body a little lighter than in the preceding, on the anal fin darker. Caudal dark crossmarks 9, but the last small, placed on the caudal fin.

N:o V. 37. Greenland, outer part of Musk-ox-bay; depth 200 m.; clay-bottom; August 21, 1900; KOLTHOFF-expedition.

Light variety, reddish blue-grey, with the crossmarks on the body faded away. Dark livid spot on the opercle and in the upper pectoral axil (to be compared with the *gracilis*-form). Caudal dark crossbands in the dorsal fin 5 conspicuous and 1 rather faded. Anal fin dark, light-edged. Scaly covering almost reaching the tip of the tail. Fins naked. Lateral lines ventral, median and dorsal, the first-named to be followed along at least half the length of the base of the anal fin. Incision in the hind margin of the pectorals rather inconspicuous.

N:o V. 38. Same locality as N:o V. 29.

Colour and markings almost completely the same as in N:o V. 26, but the hindmost crossbands still less marked, and the opercular tract darker.

N:o V. 39. Same locality as N:o V. 37.

Light variety, with the pale dark saddle-marks running together below, thus turning the light interspaces to saddle-marks on the upper part of the sides of the body and in the dorsal fin. Anal opening below the hind margin of the second abdominal dark saddle-mark. 7 conspicuous and 1 rather indistinct dark caudal crossband in the dorsal fin together with an obscure dusky spot on the caudal fin, whose tip however is light. Opercular spot rather indistinct. Branchiostegal membrane light livid. Belly rather light. Incision in pectorals feeble. Lateral lines, except the ventral, indistinct. Scales as in the preceding specimen.

N:o V. 40. Same locality as N:o V. 29.

Colour intermediate between the dark and light varieties, with the dark crossmarks brownish red on the body, rather black in the dorsal fin. Light caudal interspaces forming crossbands on the body and the vertical fins. Tip of the tail light. Anal opening below the front part of the first caudal saddle-mark. Branchiostegal membrane and belly livid. Caudal dark crossbands 6, all complete. Scaly covering extending on the basal third part of the dorsal fin, else as in the preceding specimen. Back margin of the large pectorals distinctly incised. Lateral lines indistinct.

N:o V. 41. Same locality as N:o V. 29.

Dark variety, with the light crossbands rather indistinct on the reddish-brown body. Only 1 abdominal and 6 caudal black crossbands in the dorsal fin, the hindmost band in the tip of the tail-fin. Anal opening below the front third part of the first caudal crossband. Scaly covering extending nearly to the tip of the tail and on the belly as well as on the basal two-thirds of dorsal and anal fins. Head with nape naked. Lateral lines indistinct. Pectorals incised.

N:o V. 42. Same locality as N:o V. 13.

In all essentials like the preceding specimen, but 7 caudal dark crossbands.

TABLE III.

Lycodes reticulatus.

1—12, forma *frigida*.

N:o R. 1. Greenland, Murchison-sound; depth 45 fathoms; July 29, 1894; Dr OHLIN. Fry-livery. Caudal saddle-marks 9; anal opening below the hind part of the first. No scales apparent.

N:o R. 2. Greenland; 73° 20′ n.; 21 20′ w.; depth 70 m.; dead (mud-) bottom; 1899; NATHORST-expedition.

Very like *Vahlii* (*Esmarkii*), f. i. N:o V. 13, above. Body white, with the dark marks almost grey and grey-brown, scarcely red. Caudal saddle-marks (resp. dark crossbands) 6. Tip of caudal fin white. Belly livid. Anal opening below the white interspace between the second abdominal and the first caudal saddle-mark. No scales.

N:o R. 3. Same locality as N:o V. 21.

Very like *Vahlii* (*gracilis*); almost uniformly pale reddish grey on the body, with bluish fins. 8 caudal oblique crossbands scarcely perceptible (9, if the dusky tip of the tail-fin be counted), the foremost of these however probably two and two belonging to the same original saddle-mark. Belly pale livid. Scales on the upper (dorsal) parts of the sides of the body from a little behind the head to half the length of the tail. Breadth of the head about twice that of the belly and about four times the breadth of the body at the beginning of the anal fin.

N:o R. 4. Same locality as the preceding specimen.

Same colour as the preceding, but with the crossmarks a little more distinct. Caudal saddle-marks (resp. crossbands behind) 6 (or 7, if the dark tip of the tail-fin be counted). Anal fin light edged, dark livid in the hind half of its length. Belly white, but a longitudinal livid band on the upper parts of its sides. Scales on the whole sides of the body (except the naked belly), in the dorsal part extending back to the end of the fifth caudal crossband, in the ventral part to the end of the fourth. Anal opening below the usual interspace.

N:o R. 5. Same locality as N:o V. 13.

Same colour and shape of the body as the preceding, but the cross-marks still more distinct, as well as the branchiostegal membrane, the belly and the light-edged anal fin in whole its length darker, more or less livid. Cross-marks on the body more reddish grey. Caudal cross-marks 6; the dark tip of the tail-fin uniting with the dark longitudinal band in the anal fin. Anal opening below the usual interspace. Hind margin of pectorals a little incised.

N:o R. 6. Same locality as the preceding, same shape of body and same colour, but paler.

N:o R. 7. Spitzberg; mouth of Ice-firth; depth 350 m.; mud-bottom; June 6, 1900; KOLTHOFF-expedition.

In colour a true *frigidus*, reddish brown, but with obscure rests of 6 caudal cross-marks and dark tip of tail-fin uniting with the blue-black anal fin. Pectorals a little incised. Head with nape, fins and belly naked.

N:o R. 8. SE. of Walrus-island; 74° 30′ n.; 18° 40′ w.; depth 80—100 m.; mud with stones; August 4, 1900; KOLTHOFF-expedition.

Paler (more reddish) *frigidus*-colour, with more distinct cross-marks. Caudal crossbands 7, the last on the caudal fin, whose tip however is light. Belly livid. Anal opening below the front half of the first caudal crossband. Scales from the base of the pectorals almost out to the hind tip of the body.

N:o R. 9. Same locality as N:o V. 12.

Pale red, almost as N:o R. 6. Above the opercle, at the upper corner of the branchial aperture, on each side of the body, a light-red spot as a rest of the original light nuchal crossband. Caudal crossmarks 7 (or 8, if an obscure mark of a crossband on the tip of the tail be counted); anal opening below the midst of the first. Scaly covering thin but expanded over the whole sides of the body (except belly) backward at least to the fifth caudal crossband. Lateral lines ventral, a thin dorsal (in the abdominal region and the fore part of the tail) and a median (in the fore and middle part of the tail).

N:o R. 10. Between Greenland and Jan-Mayen; 72° 42′ n.; 14° 49′ w.; depth 2000 m.; mud with foraminifera; August 27, 1900; KOLTHOFF-expedition.

Head, fore-part of body, and fins bluish red, tail red, uniform. Vertical fins black-edged.

N:o R. 11. Same locality as preceding. Uniform red. Scales on belly and on the back forward to half way between dorsal fin and head.

N:o R. 12. Same locality as preceding. Uniform greyish-red. Scales as on preceding.

13—22, forma *seminuda*.

N:o R. 13. Greenland; 73° 55′ n.; 19° 20′ w.; depth 150 m.; mud-bottom; August 7, 1900; KOLTHOFF-expedition.

Colour very light; the white interspaces broader than the reddish-grey, dark-brown-edged crossmarks. Caudal saddle-marks (resp. crossbands behind) 5, the three hindmost forming bands crossing both body and vertical fins; tip of tail with fin white. Belly feebly bluish. Anal opening below the interspace between the second abdominal and first caudal saddle-mark. No scales.

N:o R. 14. Same locality as N:o V. 29.

Rather dark variety, with bluish belly and with the lower (ventral) reddish parts of the saddle-marks uniting, thus giving the white interspaces the appearance of more or less drop-like saddle-marks. White, reddish-brown-edged spot on the neck left as a remnant from the original white nuchal cross-band, which besides has left a smaller white spot on the opercle of each side, at the upper angle of the branchial aperture. Caudal dark crossmarks 8, the hindmost on the tip of the tail with caudal fin. Anal opening below the first caudal dark saddle-mark. Scales on the sides of the fore part of the tail backward to the penultimate dark crossband. Length of the intermaxillar as well as of the palatine series of teeth 6.2 mm.

N:o R. 15. Same locality as N:o V. 37.

A little paler than the preceding, only the third and fourth dark caudal crossmarks uniting below. Nuchal white crossband as in the preceding. Caudal dark crossmarks 8; anal opening below the back part of the first. Scales on the sides of the tail, from the second dark caudal crossband backward almost to the hind tip of the body. Length of the intermaxillar series of teeth 9 mm., of the palatine 8.2 mm.

N:o R. 16. Spitzberg, Ice-firth, Coal-bay: depth 100 m.; rocky bottom; June 16—20, 1900; KOLTHOFF-expedition.

Dark (reddish-blue) variety, with narrow white crossmarks. Nuchal white crossband incompletely 4-partite. Caudal dark crossmarks 6 (7, if the dark tip of the tail-fin be counted); anal opening below the front part of the first. Scales thin, from the first to the fifth dark caudal crossmarks. Length of intermaxillar series of teeth 6.1 mm., of palatine 6.7 mm.

Adn. $^{b}/_{v}$ % very *frigidus*-like, but lateral lines median and dorsal. Cfr. N:o R. 19, below.

N:o R. 17. Same locality as N:o V. 13.

Rather light variety, with narrow white crossmarks but light interior of the dark ones. Nuchal light crossband undivided. Caudal dark crossmarks 6, besides a dark spot on the tip of the tail, united with the last dark crossband in the white-edged anal fin. Tip of tail-fin white. Belly light livid. Anal opening below the interspace between the second abdominal and the first caudal saddle-marks. Scales of *seminudus*. Length of the intermaxillar series of teeth 10.6 mm., of the palatine 9.2 mm.

N:o R. 18. Same locality as N:o R. 14.

Very similar to N:o R. 14, but caudal dark crossmarks 6. The white-edged anal fin reddish livid. White nuchal crossband as N:o R. 14. Scales as *seminudus*. Length of intermaxillar series of teeth 10.6 mm., of palatine 9.6 mm.

N:o R. 19. Sibiria, Chatanga-bay; specimen figured in SMITT, *Scand. Fish.*, ed. 2, p. 612.

Length of the intermaxillar series of teeth 8 mm., of the palatine 11.7 mm. This specimen together with N:o R. 16, above, may perhaps be marked as a separate form, characterized by short head (b; b_1; b_2), rather forward advanced ventral fins (v; v_1) and long abdomen (tr); although it seems to be the most natural to hold them as merely individual variations.

N:o R. 20. Same locality as N:o R. 14.

Colour mostly as N:o R. 18, livid and reddish, the three foremost (two abdominal and one caudal) white interspaces being saddle-marks, the four hindmost (the white tip of the tail-fin inclusive) being crossbands, but the last of these having its lower part dusky and united with the dark colour of the anal fin. Form of the tail with fins acute, dagger-like. Caudal dark crossbands 5 (or 6, if the dusky, lower part of the tail-fin be counted). Anal opening below the usual interspace. Scales as *seminudus*. Median lateral line most conspicuous, dorsal and ventral lines thin and irregular. Length of intermaxillar series of teeth 11.9 mm., of palatine 12 mm.

N:o R. 21. Greenland; 74° 52′ n.; 17° 16′ w.; depth 350 m.; mud with sand and pebbles; July 4, 1899; NATHORST-expedition.

Colour as preceding, but more uniformly red on the body. Form of the tail as preceding. Caudal dark crossmarks 7, the dark tip of the tail-fin inclusive. Scaly covering as *seminudus*, beginning at the hind margin of the first caudal dark crossmark. Length of the intermaxillar as well as of the palatine series of teeth 13.3 mm.

N:o R. 22. Same locality as N:o V. 13 and R. 17.

Rather light variety, red and white. Nuchal white crossband entire. Elongated and acute form of body. Caudal dark crossmarks 8, the hindmost on the tip of the tail, the two foremost white in their interior, thus hinting to the origin of secondary white saddle-marks. Scales as *seminudus*, reaching forward about to the beginning of the anal fin. Anal opening below the usual white interspace. Length of the intermaxillar series of teeth 14.9 mm., of the palatine 12.8 mm.

23—36, forma *reticulata*.

N:o R. 23. Spitzberg, Treurenberg-bay; 5 fathoms; August 1861; GOËS and SMITT.

Type-specimen for *Lycodes Rossi*, MALMGREN; figured in SMITT, *Scand. Fish.*, ed. 2, p. 612, and in COLLETT, *Lyc. gracilis*, Vid. Selsk. Skr. Chrnia, I, M. N. Kl. 1899, N:o 6, p. 9.

N:o R. 24. Greenland; 75° 26′ n.; 260 fathoms; mud-bottom; 1883, A. E. NORDENSKIÖLD.

Same fry-livery as preceding, but the first caudal saddle-mark reaching the base of the anal fin. No scales. Whole brain visible through its coverings.

N:o R. 25. Greenland, Inglefield Gulf, 25 fathoms; August 8, 1894; Dr A. OHLIN.

Fry-livery. Caudal crossmarks 4, the first and second scarcely reaching the anal fin, the two hind ones crossing that fin also. No scales. Brain visible as before. Anal opening below the usual interspace.

N:o R. 26. Greenland; 72° 25′ n.; 17° 56′ w.; depth 300 m.; sand and stones; July 7, 1900; KOLTHOFF-expedition.

Colour as in LÜTKEN, *Kara-Havets Fiske*, tab. XVI, fig. 6, with the inner field of the dark crossmarks greyish-red, and the oblique bands in the vertical fins resp. dark-brown (almost black) and white. Light nuchal crossband 4-partite. Caudal dark crossmarks 7, the hindmost in the tip of the tail-fin; anal opening below the front margin of the first. Scales rather indistinct but perceptible on the upper and middle parts of the sides of the body from the back margin of the first to the third caudal dark crossmark. Length of the intermaxillar as well as palatine series of teeth 3 mm.

N:o R. 27. Spitzberg, west off Cape Mitra; 79° 10′ n.; 11° w.; depth 100 m.; mud-bottom; July 2, 1900; KOLTHOFF-expedition.

Colour as preceding but the red parts a little darker. Caudal dark crossmarks 6 (besides a little dark spot in the tip of the tail-fin), the four hind ones crossing the anal fin also; anal opening below the middle part of the first. Belly light bluish. Scales in a longitudinal band, about a third of the height of the body, in the middle of the sides from the midst of the abdomen to the second dark caudal crossmark. Length of intermaxillar series of teeth 3.1 mm., of palatine 3.6 mm.

N:o R. 28. Same locality as N:o R. 13.

Colour very similar to the preceding. White nuchal crossband imperfectly 3-partite. The two abdominal and the two first caudal dark saddle-marks uniting below, thus forming between themselves three droplike saddle-marks (compare fig. 4, tab. XVI in LÜTKEN, l. c.). Caudal dark crossmarks 6 (besides a little, dusky spot on the tip of the tail, in front of the uncoloured tail-fin). Anal opening below the usual interspace. Ventral side of head as well as belly and pectorals milk-white. Longitudinal band of scales on the sides of the body a little broader and longer than in the preceding, reaching from the front of the first abdominal to the back of the second caudal dark saddle-mark. Length of intermaxillar series of teeth 3.2 mm., af palatine 4.6 mm.

N:o R. 29. Greenland, Franz-Joseph-Firth; 73° 32′ n.; 24° 38′ w.; depth 100—110 m.; mud, gravel and pebbles; August 28, 1899; NATHORST-expedition.

Colour very similar to the preceding, with the same three droplike white saddle-marks, and with the same but more complete partition of the white nuchal crossband. Caudal dark crossmarks 5; anal opening below the middle part of the first. Tail-fin white. Scaly covering extending over the whole sides of the body, except the belly, from the front of the first abdominal to the back of the fourth caudal dark crossmark. Length of intermaxillar series of teeth 4.3 mm., of palatine 5.2 mm. Left pectoral deformed; its hind margin deeply incised.

N:o R. 30. Same locality as N:o R. 13.

Colour as the preceding; behind the 3-partite white nuchal crossband thus there are 5 white, droplike saddle-marks and 4 white crossbands, the hindmost on the tip of the tail, but with a black spot on the tip of the caudal fin. Anal opening below the third white saddle-mark. Lower side of head white: belly and anal fin light bluish. Scaly covering extending backward to $^2/_3$ of the length of the anal fin. Length of intermaxillar series of teeth 4.2 mm., of palatine 5.7 mm.

N:o R. 31. Same locality as N:o R. 26.

Very light variety, with the white interspaces almost as broad as the dark and uniting below with the white ventral side. White nuchal crossband imperfectly 4-partite. Caudal dark crossmarks 5, besides the dark tip of the caudal fin. The second abdominal and the three first caudal saddle-marks with their resp. lower parts (below the dorsal fin) four-sided, in their interior light-red, and with the lower corners extracted both for meeting each other from the one saddle-mark to the other in the middle of the sides of the body and for expanding right down. The significance of this figuration will be more clearly seen below, in the N:o R 34. Anal fin in the front third white. Anal opening below the usual interspace. Scales on the body from the middle of the length of the pectorals to $^{2}/_{3}$ of the base of the anal fin. Length of the intermaxillar series of teeth 4.5 mm., of the palatine 5 mm.

N:o R. 32. Same locality as N:o R. 26.

Colour not quite so light as the preceding. Nuchal white crossband as in N:o R. 30. The two abdominal and the three first caudal dark saddle-marks uniting below, thus making the four white interspaces between themselves droplike saddle-marks. Upper parts of the sides of the body, bounding on the lower parts of the abdominal saddle-marks, marked by a longitudinal livid band. Caudal dark crossmarks 6, besides the dark tip of the tail-fin. Anal opening below the front margin of the first caudal dark saddle-mark. Scales as in the preceding. Length of intermaxillar series of teeth 4.8 mm., of palatine 5.5 mm.

N:o R. 33. Greenland, S.E. off Pendulum-Island, 74° 35′ n.; 18° 15′ w.; depth 150 m.; mud with stones; August 5, 1900; KOLTHOFF-expedition.

Colour about as in the preceding, but more bluish. White nuchal crossband almost vanished in the midst of the neck. Caudal dark crossmarks 6 (if the dark tip of the tail-fin be counted), the two first being saddle-marks with their interior just below the dorsal fin as light as the white interspaces, the third crossing both dorsal and anal fin, the fourth and fifth uniting below to form a semicircular ring. Anal opening below the usual interspace. Scales obscure because of the slimy skin. Length of the intermaxillar series of teeth 6 mm., of the palatine 7 mm.

N:o R. 34. Same locality as N:o R. 26.

Figured in our plate, fig. 4 and 5, where it will be seen, how the above-named figuration in N:o R. 31 gives the origin to the reticulate appearance, which has given its name to the species. Scales from the front margin of the second abdominal to the third caudal dark saddle-mark. Length of the intermaxillar series of teeth 7.7 mm., of the palatine 8.5 mm.

N:o R. 35. Same locality as N:o R. 26.

Colour about as in N:o R. 33. White nuchal crossband rather broadly (as broad as half the breadth of the interorbital space) interrupted in the midst of the neck. Caudal dark crossmarks 6 (if the dark tip of the tail-fin be counted). Head above figured as in the preceding. Anal opening below the usual interspace. Abdominal scales extremely thin, the scaly covering rather inconspicuous in front of the second caudal dark crossmark. Pectorals broad. Length of the intermaxillar series of teeth 8.9 mm., of the palatine 9 mm.

N:o R. 36. Same locality as N:o R. 26.

Red variety, with all the white interspaces, except the hindmost, through the union of the dark crossmarks, transformed to droplike saddle-marks, but with a light, round spot below each of them. White nuchal crossband 4-partite. Caudal dark crossmarks as in the preceding, anal opening below the front margin of the first. Scaly covering extending from the middle of the length of the pectoral, but rather thin in the front part of the sides of the body. Length of the intermaxillar series of teeth 11.3 mm., of the palatine 14 mm.

Explanation of plate.

Fig. 1. *Lycodes Verrillii*, specimen N:o 1 in the table of measurements I. Natural size.
» 2. Head of the same, seen from above. $^2/_1$ nat. size.
» 3. Head of the same, seen from below. $^2/_1$ nat. size.
» 4. *Lycodes reticulatus*, specimen N:o R. 34 in the table of measurements III. Nat. size.
» 5. Head of the same, seen from above. Nat. size.

Letters on the tissue-paper:

Distance	between	a	and	α	corresponds	to	a	in	the	tables	of	measurements
»	»	a	»	$\ddot{a}$	»	»	$a—\ddot{a}$	»	»	»	»	»
»	»	a	»	b	»	»	b	»	»	»	»	»
»	»	a	»	b_1	»	»	b_1	»	»	»	»	»
»	»	b_2	»	b_1	»	»	b_2	»	»	»	»	»
»	»	b_p	»	b	»	»	b_p	»	»	»	»	»
»	»	c	»	b_p	»	»	c	»	»	»	»	»
»	»	a	»	c	»	»	e	»	»	»	»	»
»	»	g	»	g_1	»	»	g	»	»	»	»	»
»	»	(g)	»	$(g)_1$	»	»	g_1	»	»	»	»	»
»	»	a	»	b_2	»	»	h	»	»	»	»	»
»	»	a_1	»	k	»	»	k	»	»	»	»	»
»	»	lt_c	»	lt_{c_1}	»	»	lt_c	»	»	»	»	»
»	»	lt_b	»	lt_{b_1}	»	»	lt_b	»	»	»	»	»
»	»	br	»	br_1	»	»	br	»	»	»	»	»
»	»	p	»	u	»	»	tr	»	»	»	»	»
»	»	a	»	m	»	»	m	»	»	»	»	»
»	»	m	»	α	»	»	n	»	»	»	»	»
»	»	m	»	$\ddot{a}$	»	»	n_1	»	»	»	»	»
»	»	o	»	o_1	»	»	o	»	»	»	»	»
»	»	p	»	pp	»	»	p	»	»	»	»	»
»	»	p	»	p_1	»	»	pb	»	»	»	»	»
»	»	a	»	r	»	»	r	»	»	»	»	»
»	»	a_1	»	r	»	»	r_1	»	»	»	»	»
»	»	r	»	s	»	»	s	»	»	»	»	»
»	»	r	»	u	»	»	t	»	»	»	»	»
»	»	a	»	u	»	»	u	»	»	»	»	»
»	»	a_1	»	u	»	»	u_1	»	»	»	»	»
»	»	u	»	α	»	»	v	»	»	»	»	»
»	»	u	»	$\ddot{a}$	»	»	v_1	»	»	»	»	»
»	»	x	»	x_1	»	»	x	»	»	»	»	»
»	»	al_1	»	al	»	»	alt_p	»	»	»	»	»
»	»	al_2	»	u	»	»	alt_u	»	»	»	»	»
»	»	al_3	»	uv	»	»	alt_{uv}	»	»	»	»	»
»	»	$\ddot{a}$	»	α	»	»	$\ddot{a}$	»	»	»	»	»

Lycodes Verrillii.

TABLE I.

	N:o 1	N:o 2		N:o 1	N:o 2
	♂	♂		♂	♂
a . . . mm.	128.5	131.7	o/a %	5.4	5.3
b/a %	13.6	13.3	p/a %	12.3	11.2
b_1/a %	12.0	11.4	pb/a %	3.1	3.1
b_2/a %	6.6	6.2	r/a %	12.5	11.5
b_p/a %	7.6	7.6	r_1/a %	10.1	10.0
lt_c/a %	6.6	6.4	s/a %	2.9	2.9
lt_b/a %	8.3	6.9	t/a %	16.3	16.3
c/a %	3.1	2.4	u/a %	29.1	28.1
e/a %	4.5	4.3	u_1/a %	26.8	26.7
g/a %	1.3	1.3	v/a %	71.0	72.0
g_1/a %	2.8	2.8	v_1/a %	69.5	70.3
h/a %	5.6	5.3	x/a %	4.6	4.7
k/a %	6.3	6.4	alt_p/a % . . .	6.2	6.1
br/a %	4.0	3.7	alt_u/a % . . .	5.0	4.7
tr/a %	14.7	15.5	alt_{uv}/a % . . .	3.3	3.3
m/a %	18.5	18.2	b/v %	19.1	18.4
n/a %	81.4	82.0	alt_u/u_1 % . . .	18.8	17.6
n_1/a %	80.1	80.3	P	14	14(15)

Lycodes Vahlii.

TABLE II.

N:o	*gracilis*										
	V. 1	V. 2	V. 3	V. 4	V. 5	V. 6	V. 7	V. 8	V. 9	V. 10	V. 11
				♀		♂		♂		♀	
a mm.	43.6	108.5	110.6	133.1	135.5	141.0	145.0	148.0	147.3	155.8	196.0
b/a %	20.0	18.7	18.0	19.2	18.3	19.9	18.6	19.5	20.5	18.4	19.0
b_1/a %	16.3	15.7	15.0	15.9	15.5	16.4	15.3	16.0	16.5	14.8	15.9
b_2/a %	9.6	10.0	9.7	9.5	8.9	9.9	8.3	9.0	10.2	7.8	7.6
b_p/a %	9.4	10.0	9.2	9.9	9.8	10.1	9.7	9.6	10.1	9.7	10.5
lt_c/a %	—	—	—	—	—	—	—	—	—	—	—
lt_b/a %	7.6	9.0	10.8	8.4	12.4	9.9	11.9	—	—	10.5	13.0
c/a %	6.6	4.6	4.6	4.5	4.8	4.7	4.3	4.7	6.0	4.3	3.6
e/a %	4.6	6.2	5.4	5.6	5.9	6.0	6.1	6.1	6.1	5.8	5.9
g/a %	2.0	1.7	1.5	2.2	2.5	1.5	2.3	1.4	1.8	2.6	1.8
g_1/a %	—	—	—	—	4.2	—	3.5	—	—	3.9	3.6
h/a %	?	8.1	7.5	8.1	7.8	9.1	8.3	9.5	8.1	7.9	9.6
k/a %	9.6	9.1	8.2	9.2	8.1	9.3	9.0	10.0	10.0	9.0	9.7
br/a %	—	—	—	—	—	—	—	—	—	7.1	7.1
tr/a %	20.9	21.2	21.8	22.5	21.8	19.9	21.4	21.6	22.4	23.7	21.9
m/a %	25.2	25.6	23.3	25.1	25.0	26.2	24.0	25.0	24.5	24.4	25.2
n/a %	76.3	74.2	76.8	75.9	75.0	74.1	75.6	75.1	75.4	77.4	75.0
n_1/a %	73.8	72.8		72.9	73.6	72.6	74.0	73.7	73.2	75.8	72.5
o/a %	—	—	—	—	3.5	—	3.2	—	—	2.9	3.0
p/a %	15.6	13.1	13.3	13.0	12.5	12.0	12.4	12.3	13.1	11.3	10.7
p_b/a %	4.1	4.8	5.1	4.5	5.3	4.6	5.0	4.7	5.4	4.3	4.9
r/a %	15.1	16.2	18.4	16.9	14.9	15.7	15.2	18.7	17.1	14.5	16.4
r_1/a %	13.7	13.5	16.5	14.8	11.4	14.0	13.1	17.5	15.6	12.9	14.9
s/a %	4.6	3.2	3.5	3.0	2.7	2.8	2.9	2.8	2.6	2.6	2.6
t/a %	25.4	24.7	23.4	23.3	25.0	24.7	25.4	22.5	23.2	26.3	25.2
u/a %	40.6	41.5	39.6	41.2	39.8	40.3	40.4	41.2	42.1	41.0	41.4
u_1/a %	39.4	40.0	38.2	38.4	36.8	38.2	38.0	40.2	40.7	39.2	39.8
v/a %	61.0	59.3	60.4	60.8	60.5	60.3	60.8	60.3	58.9	58.0	59.7
v_1/a %	59.1	57.1	57.9	58.4	59.6	58.2	59.0	58.4	55.8	57.0	57.7
x/a %	—	—	—		2.9	—	3.8	—	—	2.6	2.8
alt_p/a %	9.6	9.3	—	9.1	9.9	9.8	10.0	—	—	9.3	9.3
alt_u/a %	6.9	8.0	7.1	8.9	9.6	8.6	9.7	7.8	8.3	9.3	9.1
alt_{uv}/a %	5.7	6.1	6.4	6.4	6.4	6.9	6.9	6.1	5.8	6.3	6.5
b/v %	32.7	31.5	30.0	31.5	30.2	32.9	30.7	32.1	34.5	31.6	31.8
P	—	18	18	17	19	18	20	17	18	18	19

N:o	*pallidus*														
	V. 12	V. 13	V. 14	V. 15	V. 16	V. 17	V. 18	V. 19	V. 20	V. 21	V. 22	V. 23	V. 24	V. 25	V. 26
				♀		♀	♀	♀	♀	♂	♂	♂	♂	♂	♀
a mm.	66.5	69.0	70.0	70.0	74.8	78.5	81.0	83.0	94.0	99.0	99.0	108.7	110.0	116.0	155.0
b/a %	22.5	22.5	20.0	20.7	21.5	20.5	21.1	20.5	21.4	22.0	22.3	23.0	22.7	22.6	21.0
b_1/a %	17.6	16.9	17.1	17.4	18.7	17.8	16.2	17.5	17.8	18.0	18.2	18.4	19.1	18.7	17.8
b_2/a %	10.4	10.6	9.7	10.3	10.7	10.2	9.9	10.9	11.8	10.7	10.3	9.9	10.9	10.8	10.3
b_p/a %	10.7	9.7	10.0	10.3	10.7	10.2	11.2	10.9	10.8	11.3	11.8	12.0	11.9	11.8	10.7
lt_c/a %	10.5	—	10.3	11.3	10.0	10.2	11.8	10.3	10.2	12.4	12.0	11.5	11.8	13.1	12.6
lt_b/a %	9.0	9.6	10.1	10.1	12.3	10.7	12.6	10.3	10.7	12.9	12.2	12.0	11.9	13.0	13.0
c/a %	4.5	7.2	4.6	4.4	4.9	4.0	3.7	4.9	5.0	5.1	5.3	3.8	4.6	4.7	3.8
e/a %	7.5	7.1	7.3	7.4	7.5	7.6	8.6	6.9	6.5	7.4	7.1	7.4	7.3	7.7	8.0
g/a %	2.6	3.3	2.3	1.7	2.4	2.0	2.4	1.4	1.6	2.1	2.1	2.3	1.8	1.8	1.4
g_1/a %	4.8	—	4.6	5.0	4.7	5.1	5.5	3.0	3.7	3.1	6.1	4.7	6.0	4.7	5.2
h/a %	8.3	7.4	7.3	8.9	8.0	8.4	8.3	8.4	7.5	9.4	10.2	9.3	10.5	10.4	9.0
k/a %	10.5	9.7	8.9	9.9	10.7	10.2	10.7	10.0	10.2	11.2	12.7	11.5	11.8	11.9	11.0
br/a %	7.5	7.2	7.0	7.3	6.6	7.3	7.5	7.2	7.9	7.6	8.1	7.8	8.3	7.8	7.8
tr/a %	19.8	18.0(?)	21.0	20.0	20.0(?)	20.4	19.7	21.8	20.2	20.9	21.7	21.1	21.8	22.4	22.1
m/a %	27.2	27.8	26.7	27.7	27.4	26.9	26.1	27.5	27.7	28.1	29.3	26.8	29.1	31.1	26.5
n/a %	73.4	71.7	74.3	72.1	72.9	72.9	74.4	72.3	72.4	71.8	70.6	73.5	72.3	68.3	74.0
n_1/a %	70.5	67.5	71.4	69.1	70.0	71.3	71.9	70.0	70.3	68.7	68.4	70.9	69.0	65.7	71.5
o/a %	4.5	—	4.3	4.6	5.4	5.2	6.1	6.0	5.3	6.1	6.1	6.4	6.2	5.3	—
p/a %	13.5	15.5	12.6	12.7	14.7	12.8	13.6	13.5	13.6	14.2	15.2	13.8	15.5	13.1	13.0
p_b/a %	6.0	5.8	5.7	5.7	6.0	5.7	5.6	5.5	5.3	5.8	5.8	5.7	5.6	5.6	5.8
r/a %	16.5	17.8	16.6	17.1	20.0	17.8	21.8	15.7	18.3	18.4	18.2	18.8	17.3	17.3	18.1
r_1/a %	15.2	15.2	15.9	14.3	17.4	16.0	17.3	14.5	16.0	16.9	16.3	16.6	15.5	15.6	16.1
s/a %	4.2	4.0	4.3	4.3	4.7	4.0	3.4	4.8	3.7	4.2	3.6	3.9	4.7	4.1	3.3
t/a %	23.2	22.2	22.1	22.9	22.7	23.8	21.3	25.4	23.5	24.8	25.3	24.8	25.9	25.7	25.8
u/a %	40.5	39.4	38.6	40.7	42.1	40.8	42.3	41.4	42.6	43.5	43.5	43.8	43.3	43.1	43.8
u_1/a %	39.1	38.1	37.4	38.1	40.0	39.2	39.7	40.7	39.9	40.6	41.5	41.6	41.8	41.2	42.0
v/a %	58.7	58.7	60.0	60.0	60.2	58.6	59.9	56.7	56.4	57.4	—	56.9	57.7	56.1	57.6
v_1/a %	55.8	55.2	57.1	56.0	57.4	57.1	57.5	55.4	55.4	54.4	56.7	54.4	54.5	54.3	55.2
x/a %	4.5	—	4.3	5.3	—	5.2	5.7	4.7	—	6.1	6.2	5.8	6.4	6.9	—
alt_p/a %	10.1	9.1	8.9	10.0	10.4	10.2	10.5	9.6	9.7	10.2	11.2	10.3	10.5	10.5	11.0
alt_u/a %	7.8	8.2	7.1	7.3	8.0	7.6	7.5	7.8	7.9	8.1	8.1	8.8	8.4	8.7	9.7
alt_{uv}/a %	5.5	5.2	5.7	5.9	5.3	5.1	5.3	5.9	5.8	6.0	6.0	6.4	6.4	6.0	6.8
b/v %	38.4	38.2	33.3	34.5	35.7	35.0	35.0	36.2	38.1	38.2	39.6	40.4	39.4	40.4	36.4
P	—	19	18	19	19	17	20	18	18	19	18	20	18(19)	18	21

N:o	*Vahlii*															
	V. 27	V. 28	V. 29	V. 30	V. 31	V. 32	V. 33	V. 34	V. 35	V. 36	V. 37	V. 38	V. 39	V. 40	V. 41	V. 42
				♀			♂			♀	♀	♀	♂	♀	♂	♂
a mm.	35.0	57.0	65.0	72.5	89.0	113.5	117.0	135.5	138.5	139.6	153.4	155.2	162.2	165.8	226.5	319.2
b/a %	19.1	21.2	21.9	21.4	20.8	23.1	21.5	22.6	22.9	22.2	20.9	22.0	23.3	22.9	23.8	23.3
b_1/a %	15.2	16.4	19.4	17.5	17.9	19.1	18.0	17.9	18.9	18.6	16.9	18.1	18.9	19.3	19.4	18.8
b_2/a %	9.5	9.1	10.8	9.7	10.2	11.1	10.3	10.3	10.6	10.0	9.1	10.3	9.7	11.5	11.0	9.2
b_p/a %	11.2	10.9	11.6	11.0	10.4	9.7	11.1	9.6	10.8	11.8	10.9	11.3	11.5	12.1	12.3	11.9
lt_c/a %	—	—	9.4	12.4	9.2	—	11.3	—	11.9	12.2	10.8	12.3	11.7	11.5	12.0	—
lt_b/a %	11.8	10.9	9.5	12.4	9.3	13.2	12.4	12.5	10.6	12.6	11.7	12.5	12.4	12.2	14.3	11.2
c/a %	6.8	7.0	4.7	3.5	5.3	6.4	5.0	6.6	3.9	3.9	3.6	4.5	3.7	4.2	4.1	4.6
e/a %	5.7	5.6	7.7	8.3	6.7	7.7	7.7	6.5	8.3	7.8	7.0	7.7	8.7	8.1	8.4	8.8
g/a %	—	3.3	2.0	2.8	2.0	1.8	1.9	2.2	1.4	1.8	1.8	1.5	1.5	2.4	2.6	3.7
g_1/a %	5.2	—	5.6	6.7	4.2	—	4.6	—	4.8	5.0	3.9	5.2	3.7	5.2	4.9	—
h/a %	7.2	8.1	8.4	8.6	7.9	9.2	8.7	9.6	9.5	9.3	8.6	9.7	10.3	9.0	10.7	11.5
k/a %	9.8	8.9	10.8	10.5	11.8	12.6	11.7	11.4	11.6	12.1	11.6	11.6	11.6	12.1	12.3	11.5
br/a %	6.1	6.4	7.7	7.2	7.9	8.8	7.8	8.1	7.9	9.3	8.5	9.0	8.7	7.4	9.3	8.8
tr/a %	25.7(?)	25.4(?)	17.7	20.8	19.2	19.3	18.7	19.6	20.7	21.1	22.3	19.4	19.7	19.7	21.6	20.3
m/a %	25.4	24.7	26.2	29.0	27.8	27.3	27.0	27.3	29.5	29.8	27.3	27.5	29.1	26.0	28.2	27.6
n/a %	74.9	76.9	72.4	70.5	72.2	73.3	73.5	73.5	70.6	70.2	73.5	73.0	72.2	74.7	71.8	75.9
n_1/a %	69.8	74.1	69.3	67.5	70.5	70.0	70.2	71.7	67.8	68.1	71.0	70.3	69.8	72.3	70.0	72.6
o/a %	—	—	6.2	6.3	5.6	—	6.0	—	6.6	7.4	—	—	—	—	—	—
p/a %	17.2	15.0	17.1	13.5	13.5	14.1	13.7	13.3	14.1	13.3	12.9	13.4	13.0	15.7	15.1	13.5
p_b/a %	6.8	5.3	5.7	6.2	5.6	6.1	5.3	5.9	5.5	5.8	5.2	5.8	5.3	5.7	6.6	6.2
r/a %	15.8	17.2	17.3	17.2	18.3	22.5	18.6	19.8	18.8	16.7	17.0	18.1	17.7	17.8	19.0	18.4
r_1/a %	14.0	14.4	15.6	15.2	16.9	19.8	16.3	17.0	15.9	15.1	15.7	15.6	16.3	16.0	17.0	15.5
s/a %	5.8	4.6	5.0	4.4	3.4	3.1	3.9	3.3	3.7	3.4	3.4	3.2	3.7	4.0	3.5	2.2
t/a %	29.5	28.5	21.3	23.5	22.1	21.1	21.4	22.0	23.1	24.3	25.4	23.2	22.2	22.1	23.4	23.0
u/a %	43.4	43.8	38.2	41.0	40.5	41.6	40.0	40.6	42.0	41.3	42.4	41.6	40.1	40.7	42.5	41.5
u_1/a %	42.6	42.1	37.0	38.9	38.9	40.5	37.2	39.2	39.4	38.9	40.5	39.2	38.0	38.6	40.5	38.7
v/a %	55.7	55.8	62.7	57.7	58.5	58.6	59.9	60.6	59.0	58.3	60.1	59.4	59.9	60.4	58.3	59.4
v_1/a %	54.0	55.2	59.6	57.2	56.8	55.5	56.6	58.3	56.3	56.2	57.7	56.8	57.4	58.0	56.3	57.1
x/a %	—	—	7.7	5.9	5.0	—	5.2	—	5.0	5.5	—	—	—	—	—	—
alt_p/a %	10.9	10.2	10.0	10.5	9.7	12.3	10.4	10.7	11.5	12.5	10.7	11.6	11.1	11.3	12.3	11.9
alt_u/a %	8.8	9.8	9.3	8.3	8.9	10.7	9.4	10.3	10.3	11.2	10.2	10.0	10.3	10.4	11.7	10.7
alt_{uv}/a %	7.1	6.8	5.2	6.2	6.7	6.6	6.6	6.7	7.2	6.9	7.1	7.1	7.4	6.3	7.0	6.5
b/v %	34.4	38.0	34.9	37.1	35.6	39.4	35.9	37.3	38.6	38.0	34.8	37.1	38.9	38.0	40.8	39.2
P	17	16	20	18(19)	20	18(19)	20	19	21	20	20	21	20	21	21	22

Lycodes reticulatus.

TABLE III.

	frigidus												*seminudus*										*reticulatus*														
N:o	R 1	R 2	R 3	R 4	R. 5	R. 6	R. 7	R. 8	R. 9	R. 10	R 11	R. 12	R 13	R. 14	R 15	R. 16	R 17	R. 18	R. 19	R. 20	R 21	R. 22	R. 23	R. 24	R 25	R. 26	R. 27	R 28	R. 29	R. 30	R 31	R. 32	R. 33	R. 34	R. 35	R. 36	
			♂	♀			♀	♂	♂	♀	♀	♀	♀	♂	♂	♀		♀				♀				♀	♂	♀		♂	♂	♀	♂	♂	♂	♂	
a . mm.	42.3	55.5	96.7	104.2	124.7	130.2	148.5	160.3	178.7	264.2	346.5	357.8	62.0	130.0	161.0	164.0	182.2	196.7	233.0	218.2	252.3	278.1	33.0	45.0	54.0	77.0	88.5	88.8	113.3	114.5	116.0	120.0	134.0	157.5	195.3	245.0	a mm.
b/a % . .	23.6	23.6	24.8	23.8	24.4	23.0	23.2	24.1	24.6	25.3	27.5	24.6	25.5	27.4	26.7	23.9	27.1	27.0	23.8	28.0	26.0	27.9	21.7	24.4	23.4	23.9	24.4	24.6	24.7	25.2	26.5	25.5	24.8	26.2	26.6	27.8	b/a %
b_1/a % . .	19.0	18.6	20.6	19.6	21.6	20.4	18.4	20.4	20.7	19.7	20.9	19.2	20.9	22.8	21.4	19.6	21.7	22.2	19.5	23.9	20.4	22.0	—	—	18.4	19.5	19.9	19.1	18.4	20.5	22.4	21.4	20.0	22.2	22.1	23.1	b_1/a %
b_2/a % . .	12.0	10.6	11.6	11.4	12.1	12.0	9.3	9.4	10.3	11.4	9.3	10.4	12.1	13.2	12.6	9.8	11.0	13.2	9.1	13.5	11.4	11.5	—	—	10.6	11.7	11.9	12.0	9.2	11.5	13.0	11.7	10.2	12.4	11.6	11.9	b_2/a %
b_p/a % . .	11.8	11.0	12.8	11.9	12.8	12.3	12.1	13.5	12.4	13.6	15.4	12.5	13.0	14.0	13.2	12.3	13.7	14.3	13.8	15.1	14.1	14.7	9.1	11.1	10.6	11.9	12.7	13.0	12.1	13.2	13.2	13.3	12.0	13.3	14.0	15.1	b_p/a %
lt_c/a % . .	—	—	13.5	14.7	14.2	12.6	12.5	11.3	14.0	14.5	15.3	11.2	14.4	12.1	14.7	12.8	—	13.0	—	12.2	—	—	—	—	—	11.5	14.7	14.5	—	15.7	13.8	15.8	14.0	14.7	16.2	16.3	lt_c/a %
lt_b/a % . .	10.6	10.6	15.2	15.9	15.9	13.2	12.8	12.4	15.1	15.9	16.2	12.6	15.7	12.7	17.1	13.4	12.6	14.8	14.2	13.8	13.5	12.2	—	—	11.2	13.1	13.6	15.3	16.1	16.2	16.4	17.4	15.5	18.4	16.8	17.8	lt_b/a %
c/a % . .	8.5	8.1	5.5	5.8	5.1	3.7	3.5	3.4	3.9	3.0	3.2	3.1	6.5	6.1	5.9	4.3	5.9	5.4	2.6	5.0	5.0	5.3	6.7	7.8	7.5	5.2	5.7	5.6	6.7	6.0	4.8	5.0	4.5	3.6	3.7	4.0	c/a %
e/a % . .	6.4	6.7	8.3	7.8	8.6	8.9	8.2	8.8	9.4	9.1	9.6	9.1	8.1	8.5	8.6	8.6	8.0	8.7	7.1	8.8	7.7	8.6	—	—	6.9	7.8	8.3	8.3	7.9	8.3	8.6	8.3	9.0	10.6	10.5	10.6	e/a %
g/a % . .	3.5	2.7	2.2	2.4	1.6	2.0	3.0	2.1	1.7	3.8	4.2	3.6	2.8	1.5	2.4	2.6	2.8	1.7	2.4	1.9	2.0	3.1	—	—	3.4	2.6	2.3	2.3	2.6	1.8	3.5	3.6	1.7	2.8	3.1	3.2	g/a %
g_1/a % . .	—	—	3.3	3.6	4.9	4.6	5.1	3.7	3.6	—	5.5	5.1	5.2	5.8	4.4	4.0	—	3.3	—	4.8	3.1	—	—	—	—	5.2	3.9	6.2	—	4.9	5.4	5.2	3.8	6.0	5.1	5.1	g_1/a %
h/a % . .	8.5	8.8	10.1	10.3	11.2	10.8	10.0	11.3	12.9	9.8	11.1	9.7	9.9	10.0	11.2	10.4	10.4	10.7	12.2	11.5	11.0	11.2	—	9.1	9.3	9.4	10.3	10.3	9.8	10.7	10.8	10.3	11.4	11.3	12.4	13.1	h/a %
k/a % . .	11.4	11.0	12.3	11.9	12.8	12.4	11.1	13.2	13.5	12.5	13.0	11.5	13.3(11.5)	13.1	13.5	11.4	12.6	12.7	12.8	13.6	13.0	13.9	—	13.5(?)	11.5	13.1	12.2	12.0	11.8	12.1	12.9	13.3	13.5(12.4)	12.7	13.2	14.1	k/a %
br/a % . .	8.5	6.7	8.9	9.5	8.4	9.2	8.1	9.4	9.6	11.1	11.2	9.6	8.9	10.8	9.9	9.3	—	10.2	8.2	10.5	10.2(9.5)	—	—	—	7.6	7.8	8.7	8.0	7.4	9.2	9.5	9.0	9.0	10.5	12.1	12.3	br/a %
tr/a % . .	24.0	21.6	21.7	22.1	20.8	21.5	21.9	25.1	22.5	25.1	26.2	24.0	21.9	23.4	24.6	27.5	22.9	24.4	28.7	25.0	22.6	23.7	24.2	22.2	24.1	22.2	24.8	23.3	23.8	23.5	23.3	23.2	24.6	23.3	24.1	25.8	tr/a %
m/a % . .	28.6	30.3	30.1	30.0	30.8	28.7	29.8	31.2	32.5	31.4	34.4	31.8	29.6	33.7	29.2	30.8	30.7	30.8	28.1	33.5	32.0	32.4	28.8	26.6	26.3	28.9	31.0	30.4	28.4	30.2	31.1	30.7	31.4	30.8	31.8	31.7	m/a %
n/a % . .	73.5	70.8	69.9	70.2	69.6	71.0	70.7	69.4	66.4	69.7	67.0	69.8	68.6	67.1	70.5	70.1	69.2	69.8	71.9	66.7	69.3	68.7	—	—	74.1	70.6	68.3	69.0	71.9	70.5	71.6	70.0	70.2	69.9	69.7	68.7	n/a %
n_1/a % . .	69.3	66.3	67.4	67.1	67.2	68.8	68.7	67.5	63.5	67.4	64.8	68.9	64.6	64.0	67.4	67.2	66.5	66.2	70.7	63.7	66.6	65.3	—	—	71.9	67.2	65.3	65.3	69.4	67.5	68.5	67.1	67.2	66.4	66.2	64.9	n_1/a %
o/a % . .	—	—	7.7	7.0	6.4	6.1	8.1	5.0	7.2	5.3	7.2	6.5	6.4	—	—	8.8	—	8.2	—	9.4	—	—	—	—	—	4.5	9.6	7.7	—	9.6	10.3	10.2	9.3	7.9	8.6	8.1	o/a %
p/a % . .	15.4	16.6	16.2	15.5	15.0	13.5	12.3	12.7	12.4	13.1	12.8	15.0	16.2	12.4	12.7	13.5	11.3	10.7	12.2	12.8	10.7	12.0	—	16.9	14.9	12.8	15.6	16.9	14.4	14.9	13.8	15.2	14.7	16.4	15.2	15.0	p/a %
pb/a % . .	6.2	6.0	6.2	5.8	6.2	6.2	6.0	6.2	5.9	6.8	6.7	6.5	6.3	6.7	6.3	6.0	6.4	6.0	5.3	6.5	6.3	6.2	—	—	5.8	6.3	6.2	7.0	6.1	6.5	7.0	6.9	6.7	7.3	7.4	7.6	pb/a %
r/a % . .	19.9	19.5	23.8	20.3	22.1	20.0	18.8	19.4	20.8	20.1	20.9	19.0	25.1	19.8	22.4	18.0	19.7	20.4	18.7	20.6	20.4	20.6	—	—	18.8	20.4	19.9	22.6	21.8	20.0	22.5	24.7	21.4	24.9	22.1	23.5	r/a %
r_1/a % . .	17.0	16.8	19.7	17.8	18.0	17.2	16.8	17.5	18.4	17.6	18.6	17.6	19.4	19.0	20.8	15.7	18.1	18.3	16.6	19.0	18.6	19.4	—	—	16.1	17.2	17.9	18.6	19.3	17.3	19.1	21.7	17.7	21.5	19.2	20.5	r_1/a %
s/a % . .	6.0	4.9	4.4	3.5	4.1	3.1	2.8	2.8	3.4	2.4	2.6	2.6	4.9	4.9	4.4	3.7	3.8	3.6	2.9	4.1	2.5	3.6	—	—	5.6	3.9	4.4	4.3	4.1	4.3	4.3	3.4	3.8	3.8	3.4	2.9	s/a %
t/a % . .	26.0	25.6	23.8	25.1	24.2	24.8	26.1	28.2	25.3	29.1	30.8	29.8	26.7	30.4	28.0	30.6	28.5	30.0	31.8	29.9	29.3	28.4	—	—	28.2	24.7	28.3	27.6	26.7	26.7	26.2	26.5	27.6	26.8	28.7	29.4	t/a %
u/a % . .	43.7	44.1	47.0	45.3	46.4	45.1	44.4	47.5	46.4	48.8	52.1	48.4	50.0	50.4	50.0	48.8	48.8	50.3	50.4	50.7	49.4	48.7	46.0	43.3	45.8	44.9	48.3	49.6	47.7	47.2	49.1	49.2	48.9	50.0	50.9	52.7	u/a %
u_1/a % . .	41.8	42.5	43.7	42.8	42.4	42.8	43.4	45.3	44.7	46.4	49.8	46.2	45.5	49.3	48.1	46.5	47.3	48.2	48.2	48.9	48.0	47.7	—	—	43.2	42.9	45.4	46.0	45.4	44.7	45.0	46.0	45.4	47.7	48.0	49.8	u_1/a %
v/a % . .	55.6	56.6	54.6	56.2	54.8	55.5	55.9	53.3	54.8	53.8	50.9	55.7	49.2	48.7	51.3	50.6	51.8	51.3	50.0	49.5	51.4	51.4	53.0	55.5	54.5	53.3	50.3	51.2	52.8	50.9	52.4	51.3	50.8	49.6	50.0	49.0	v/a %
v_1/a % . .	53.4	51.3	52.0	53.0	52.4	53.3	53.8	51.4	51.8	51.6	49.1	53.8	45.7	45.2	48.1	47.7	48.3	47.7	48.6	46.5	48.3	47.3	—	—	51.5	49.9	47.3	47.8	50.1	47.7	49.3	48.4	47.7	46.1	46.5	45.3	v_1/a %
x/a % . .	—	—	5.7	6.9	4.9	5.4	5.7	5.0	5.6	4.5	6.8	5.8	6.3	—	—	6.7	—	6.1	—	6.5	—	—	—	—	—	4.5	6.6	6.0	—	8.7	7.7	7.2	7.4	6.3	8.2	7.7	x/a %
alt_p/a %	11.8	10.5	12.1	11.6	12.1	10.9	11.1	10.6	11.8	14.5	15.3	12.7	11.3	11.6	11.3	11.9	10.9	12.0	11.5	12.5	11.5	12.8	—	—	11.3	11.7	12.3	12.4	12.2	12.9	13.8	14.2	14.0	13.2	14.4	16.6	alt_p/a %
alt_u/a % .	9.2	7.6	8.1	8.5	8.4	8.4	8.7	8.7	9.0	12.5	12.1	11.5	9.9	9.2	10.3	9.9	9.2	9.2	9.1	10.1	8.9	10.1	9.1	9.1	8.9	10.2	10.3	11.3	10.5	10.6	10.4	10.7	10.6	10.9	11.5	12.5	alt_u/a %
alt_{uv}/a %	5.7	5.6	6.0	5.7	6.0	6.1	6.6	6.3	6.4	6.8	6.7	6.9	7.2	6.2	7.5	7.3	6.9	6.2	6.2	7.2	6.7	7.4	6.7	6.7	6.5	7.8	7.7	7.3	7.5	7.1	7.7	7.5	7.4	6.8	7.2	7.3	alt_{uv}/a %
b/v % . .	42.6	43.6	45.5	42.3	44.5	41.3	40.9	45.2	45.9	47.0	51.1	44.1	51.8	56.2	52.1	47.2	52.1	52.6	47.6	56.5	50.6	54.1	40.0	41.2	42.8	44.9	48.5	47.9	46.8	49.5	50.5	49.7	48.9	52.9	53.1	56.7	b/v %
P	16	19	20	19	19	18	20(21)	18	20	21(22)	22	21(22)	22	21	21	19	21	21	17	22	20(21)	22	—	—	19	21	20	20	19	21	21	20	21	21(22)	21	21	P

Averages.

TABLE IV(1).

	10 specimens	15 specimens	14 specimens	10 specimens	10 specimens	11 specimens
	gracilis	*pallidus*	*Vahlii*	*frigidus*	*seminudus*	*reticulatus*
a . . . mm.	142.1	91.6	146.6	191.2	187.7	131.8
b/a %	19.0	21.6	22.3	24.5	26.3	25.5
b_1/a %	15.7	17.9	18.5	20.1	21.4	20.8
b_2/a %	9.1	10.5	10.3	10.7	11.7	11.6
b_p/a %	9.9	10.9	11.1	12.9	13.8	13.1
lt_c/a %	—	11.3	11.3	13.4	13.2	14.7
lt_b/a %	10.7	11.3	11.9	14.5	14.0	16.1
c/a %	4.6	4.7	4.6	4.0	5.2	5.5
e/a %	5.9	7.4	7.8	8.8	8.3	8.9
g/a %	1.9	2.1	2.1	2.5	2.3	2.7
g_1/a %	3.8	4.7	4.9	4.3	4.4	5.1
h/a %	8.4	8.7	9.4	10.7	10.8	10.9
k/a %	9.2	10.7	11.7	12.4	12.9	12.8
br/a %	7.1	7.5	8.3	9.5	9.7	9.4
tr/a %	21.8	20.7	20.0	23.1	24.5	23.8
m/a %	24.8	27.7	27.8	31.1	31.1	30.6
n/a %	75.4	72.4	72.6	69.4	69.2	70.0
n_1/a %	73.7	69.7	70.1	67.1	66.2	66.8
o/a %	3.2	5.5	6.4	6.6	8.2	9.0
p/a %	12.4	13.8	14.0	13.8	12.4	15.0
pb/a %	4.8	5.7	5.8	6.2	6.2	6.8
r/a %	16.4	18.0	18.4	20.5	20.5	22.2

Table IV(2).

	10 specimens	15 specimens	14 specimens	10 specimens	10 specimens	11 specimens
	gracilis	*pallidus*	*Vahlii*	*frigidus*	*seminudus*	*reticulatus*
a . . . mm.	142.1	91.6	146.6	191.2	187.7	131.8
$^{r_1}/_{a}$ %	14.4	15.9	16.3	17.9	18.5	19.1
$^{s}/_{a}$ %	2.9	4.1	3.6	3.2	3.8	3.9
$^{t}/_{a}$ %	24.4	24.0	22.7	26.7	29.4	27.2
$^{u}/_{a}$ %	40.8	42.0	41.0	47.1	49.7	48.9
$^{u_1}/_{a}$ %	38.9	40.0	39.0	44.7	47.8	46.0
$^{v}/_{a}$ %	59.9	58.2	59.5	54.5	50.5	51.1
$^{v_1}/_{a}$ %	57.9	57.6	57.1	52.2	47.3	47.8
$^{x}/_{a}$ %	3.0	5.6	5.7	5.1	6.4	6.0
$^{alt_p}/_{a}$ % . . .	9.5	10.2	11.2	12.3	11.7	13.4
$^{alt_u}/_{a}$ % . . .	8.7	8.1	10.1	9.6	9.6	10.9
$^{alt_{uv}}/_{a}$ % . . .	6.4	5.4	6.7	6.3	6.9	7.4
$^{b}/_{v}$ %	31.8	37.2	37.5	45.1	52.1	49.4
$^{alt_u}/_{u_1}$ % . . .	22.2	20.2	26.0	21.3	20.1	23.6

TABLE V(1).

N:o in the collection[1]	Sex.	a, in mm.	alt_u/u_1 %					
			gracilis	*pallidus*	*Vahlii*	*frigidus*	*semi-nudus*	*reticulatus*
R. 12	♀	357.8	—	—	—	24.9	—	—
R. 11	♀	346.5	—	—	—	24.3	—	—
V. 42	♂	319.2	—	—	27.7	—	—	—
R. 22	♂	278.1	—	—	—	—	21.2	—
R. 10	♀	264.2	—	—	—	27.0	—	—
R. 21	—	252.3	—	—	—	—	18.6	—
R. 36	♂	245.0	—	—	—	—	—	25.1
R. 19	—	233.0	—	—	—	—	18.9	—
V. 41	♂	226.5	—	—	28.9	—	—	—
R. 20	—	218.2	—	—	—	—	20.7	—
R. 18	♀	196.7	—	—	—	—	19.1	—
V. 11	—	196.0	22.9	—	—	—	—	—
R. 35	♂	195.3	—	—	—	—	—	24.1
R. 17	—	182.2	—	—	—	—	19.5	—
R. 9	♂	178.7	—	—	—	20.1	—	—
V. 40	♀	165.8	—	—	27.0	—	—	—
R. 16	♀	164.0	—	—	—	—	21.3	—
V. 39	♂	162.2	—	—	27.2	—	—	—
R. 15	♂	161.0	—	—	—	—	21.4	—
R. 8	♂	160.3	—	—	—	19.2	—	—
R. 34	♂	157.5	—	—	—	—	—	22.9
V. 38	♀	155.2	—	—	25.5	—	—	—
V. 10	—	155.8	23.7	—	—	—	—	—
V. 26	♀	155.0	—	23.4	—	—	—	—
V. 37	♀	153.4	—	—	25.2	—	—	—
R. 7	♀	148.5	—	—	—	20.0	—	—
V. 8	♂	148.0	19.4	—	—	—	—	—
V 9.	♀	147.3	20.4	—	—	—	—	—
V. 7	—	145.0	25.6	—	—	—	—	—
V. 6	♂	141.0	22.5	—	—	—	—	—

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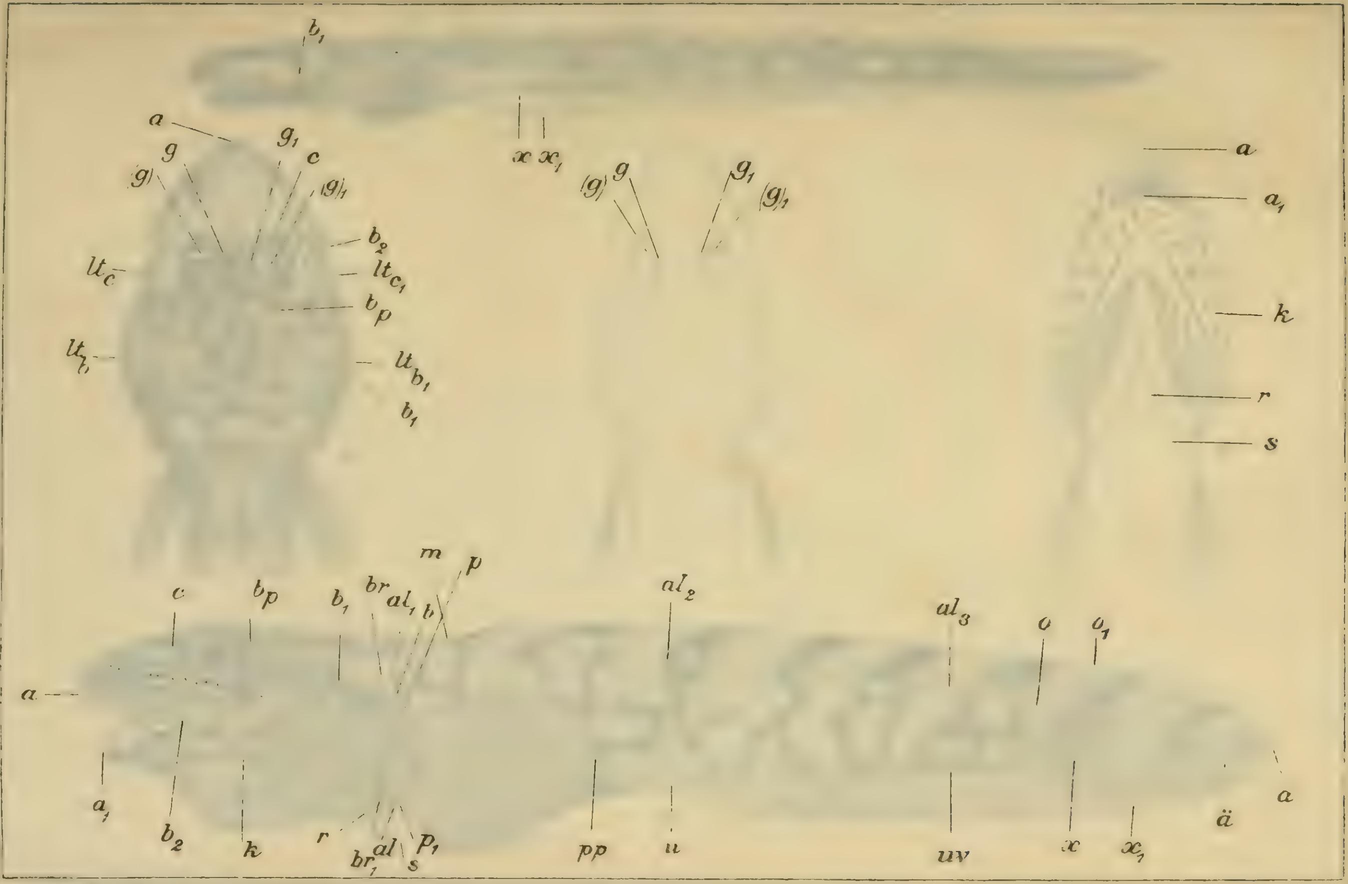
[1] *R.* means *reticulatus*-group (table III).
V. » *Vahlii*-group (table II).

TABLE V(2).

N:o in the collection	Sex.	a, in mm.	alt_u / u_1 %					
			gracilis	*pallidus*	*Vahlii.*	*frigidus*	*seminudus*	*reticulatus*
V. 36	♀	139.6	—	—	28.8	—	—	—
V. 35	—	138.5	—	—	26.1	—	—	—
V. 34	—	135.5	—	—	26.3	—	—	—
V. 5	—	135.5	26.0	—	—	—	—	—
R. 33	♂	134.0	—	—	—	—	—	23.4
V. 4	♀	133.1	23.2	—	—	—	—	—
R. 6	—	130.2	—	—	—	19.6	—	—
R. 14	♂	130.0	—	—	—	—	18.7	—
R. 5	—	124.7	—	—	—	19.8	—	—
R. 32	♀	120.0	—	—	—	—	23.3	—
V. 33	♂	117.0	—	—	25.3	—	—	—
V. 25	♂	116.0	—	21.1	—	—	—	—
R. 31	♂	116.0	—	—	—	—	—	23.2
R. 30	♂	114.5	—	—	—	—	—	23.7
V. 32	—	113.5	—	—	26.4	—	—	—
R. 29	—	113.3	—	—	—	—	—	23.1
V. 3	—	110.6	18.6	—	—	—	—	—
V. 24	♂	110.0	—	20.1	—	—	—	—
V. 23	♂	108.7	—	21.2	—	—	—	—
V. 2	—	108.5	20.0	—	—	—	—	—
R. 4	♀	104.2	—	—	—	19.9	—	—
V. 22	♂	99.0	—	19.5	—	—	—	—
V. 21	♂	99.0	—	20.0	—	—	—	—
R. 3	♂	96.7	—	—	—	18.5	—	—
V. 20	♀	94.0	—	19.8	—	—	—	—
V. 31	—	89.0	—	—	22.9	—	—	—
R. 28	♀	88.8	—	—	—	—	—	24.6
R. 27	♂	88.5	—	—	—	—	—	22.7
V. 19	♀	83.0	—	19.2	—	—	—	—
V. 18	♀	81.0	—	18.9	—	—	—	—
V. 17	♀	78.5	—	19.4	—	—	—	—
R. 26	♀	77.0	—	—	—	—	—	23.8
V. 16	—	74.8	—	21.0	—	—	—	—
V. 30	♀	72.5	—	—	21.4	—	—	—

TABLE V(3).

N:o in the collection	Sex.	a, in mm.	alt_u/u_1 %					
			gracilis	*pallidus*	*Vahlii*	*frigidus*	*seminudus*	*reticulatus*
V. 15	♀	70.0	—	19.2	—	—	—	—
V. 14	—	70.0	—	19.0	—	—	—	—
V. 13	—	69.0	—	21.5	—	—	—	—
V. 12	—	66.5	—	20.0	—	—	—	—
V. 29	—	65.0	—	—	25.0	—	—	—
R. 13	♀	62.0	—	—	—	—	21.8	—
V. 28	—	57.0	—	—	23.3	—	—	—
R. 2	—	55.5	—	—	—	17.9	—	—
R. 25	—	54.0	—	—	—	—	—	20.6
V. 1	—	43.6	17.5	—	—	—	—	—
R. 1	—	42.3	—	—	—	22.0	—	—
V. 27	—	35.0	—	—	20.7	—	—	—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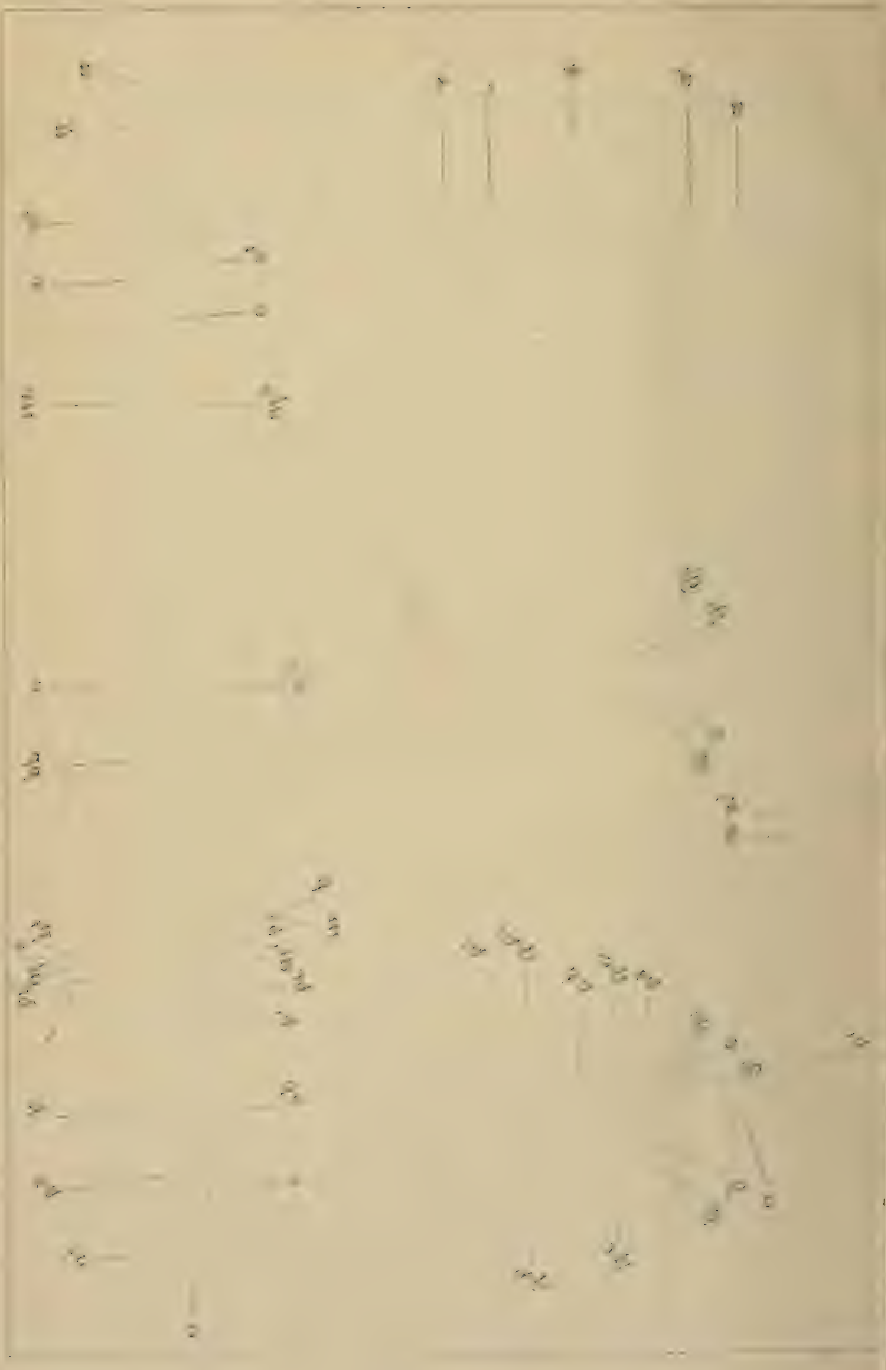

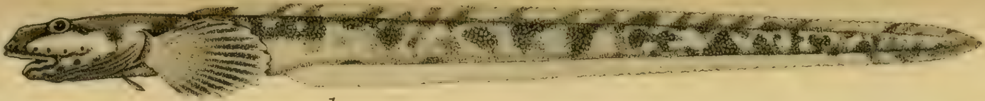
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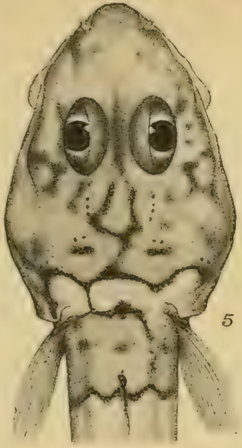
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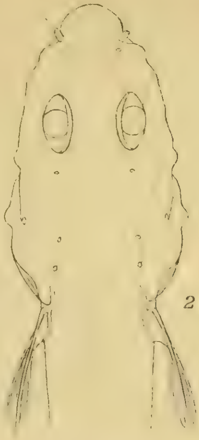
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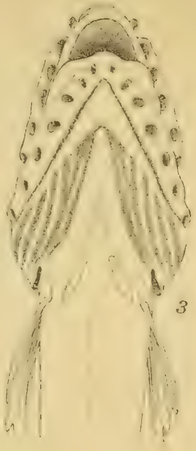
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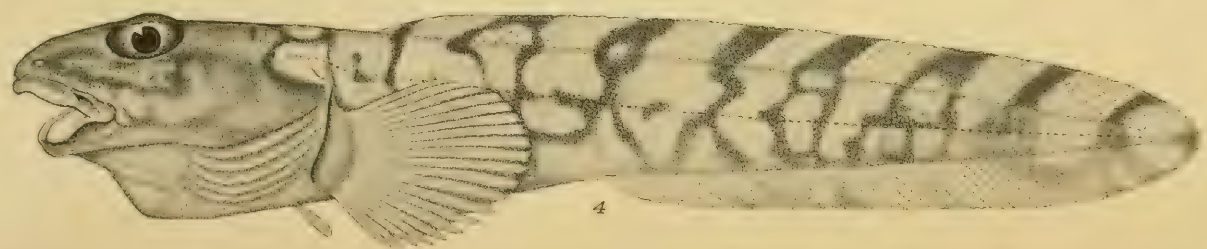
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A. Osterberg del.

Ljustryck af Cla Westphal, Stockholm.

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 5.

SOME NEW SPECIES OF SNAKES

FROM CAMEROON AND SOUTH AMERICA, BELONGING TO THE COLLECTIONS OF THE ROYAL MUSEUM IN STOCKHOLM

BY

LARS GABRIEL ANDERSSON,
PHIL. LIC.

WITH TWO PLATES

COMMUNICATED APRIL 10, 1901.
REVISED BY F. SMITT AND HJALMAR THÉEL.

◆

STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1901

At the request of the Director of the vertebrate department of the Royal Museum in Stockholm, Professor F. A. Smitt, the auctor of this small paper has determined and cataloguised the collections of reptiles and batrachians, there are to be found in this museum. By this, it was shown that among the rich collection of snakes there were several, hitherto not described, species, on which now in this paper I am intend to give diagnoses and figures. Most of these new species (5) came in the year 1885 from Mapanja, Cameroon, from Messrs. Knutson and Valdau, swedish merchants and explorers in that country. A few specimens, belonging to these same species, were received in 1886 by Mr. Knöppel and one by the swedish naturalist, Doctor R. Jungner, who in the years 1890—91 travelled in Cameroon. The three south-American forms are all obtained in 1862 from Doctor Touzet at Rio Janeiro by kind mediation of Mr. Hyltén-Cavallius, at that time Swedish Chargé d'affaires to the Brasilian court. One of the new species is kept in the Royal Museum since old times without any information of patria, collector or year, when collected.

Beside these diagnoses of new species I beg also to offer some notes on some specimens of snakes in the collections of the museum, which differ from the typical forms, hoping they will be interesting for the herpetologist.

To my honoured chief, Professor F. A. Smitt, I want to express my sincere gratitude for his great kindness of permitting me to get the drawings of my figures at the expenses of the museum, by which it has been possible to obtain good figures for the diagnoses.

Ungalia brasiliensis. Spec. nov.

Plate I, figure 1.

Maxillary teeth 19, mandibular teeth about equal in number, in both jaws all solid, closely set, and decreasing in size from the large anterior ones. Head depressed, small, but at the base distinctly broader than the narrow neck. Eye small, half the length of its distance to the tip of the snout; pupil vertical. Rostral broader than deep, not visible from above, with its upper margin bordered by a little pentagonal shield, placed between the rostral, the nasals, and the internasals. Two internasals, considerably broader than long. Two pairs of præfrontals; the anterior pair much larger than the posterior and in contact with the third upper labial shield. Both pairs considerably broader than long. The nostril oblong, pierced in the anterior part of a rather elongate, semidivided nasal. No loreal. A single great præocular with its upper margin broadly in contact with the posterior præfrontal and separated from the nasal by the anterior præfrontal. Frontal pentagonal, much broader than the supraocular, $1^1/_3$ as long as broad, and as long as its distance from the tip of the snout. Parietals small, much smaller than the frontal. Two postoculars; temporals 2 + 3. Upper labials 9 or 10; 4—6th or 4—7th entering the eye. Nine lower labials; the chin with a longitudinal groove, which on both sides is bordered by four small irregular scales; of these the two anterior ones are in contact with the three anterior lower labials, the two posterior being separated from the labials by scales. Body short and compressed, the posterior part much higher than the anterior. Scales in 21 rows, smooth; the vertebral row enlarged. Ventral shields 178; anal entire. The tail short, prehensile, and pointed; subcaudals 37, all single.

The colour above brown with indistinct round dark spots, arranged in six rows; the head ligther than the body, with a dark streak from the eye to the angle of the mouth, small dark spots on the frontal shield, and a dark angle-shaped marking on the occiput. Lower parts yellowish and black; the black colour is arranged in two rows of great square spots which on the posterior part of the trunk, alternating with each other, form a broad zig-zag line; on the anterior part as also on the tail these spots confluent into broad oblique cross bands, which on the tail and on the throat are narrower, but on other parts as broad as or broader than the light interspaces between them.

As shown above, this species agrees rather well in colour with other species of *Ungalia*, hitherto described, from which, however, it is beside other characters distinctly separated by its broad vertebral row of scales and by the small number of scale-rows, characters not coincident in any other *Ungalia*-species.

The specimen in question belongs to the collection from Doctor TOUZET. The labels belonging to this collection are marked »Brasilia». The new *Ungalia* would then differ even in the geographical distribution from other *Ungalia*-species, hitherto known, the patria of which is the West Indies, the Central America, and the west South America.

The single specimen is a female.

Total length 325 mm., tail 42 mm.[1]

Pseudoboodon, Peracca.

Among the fine collection of snakes which the Royal Museum in 1885 received from Mapanja, Cameroon, from Messrs. KNUTSON and VALDAU, there were six specimens, evidently belonging to the same genus, which on account of the form of the teeth ought to be closely allied to the genus *Boodon*. By a deep loreal pit, however, the specimens in question are distinctly separated from this genus and neared to *Bothrolycus* as also to *Bothrophthalmus*, although they generically differ from these in the teeth. On these reasons, when cataloguising the snakes of the museum, I came to the conclusion that those six specimens, which evidently represented two undescribed species, nearly allied to each other, ought to be arranged under a new genus, provisionally in the catalogue named *Pseudoboodon* by me.

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[1] Length of the head (distance between the nose and the hind margin of the parietals) 8 mm. Greatest breadth of the head 6,8 mm. Longitudinal diameter of the eye 2 mm. Distance from the eye to the snout 3,6 mm.

On closer studying of the herpetological literature of the later time, I found, however, that this name was given by PERACCA to a new snake from Eritræa, East Africa, named by him *Pseudoboodon Gascæ* and described in *Boll. dei Musei di Zool. ed Anatomia comp. della Università di Torino* vol. 12 N:o 273; 1897. At the first glance on PERACCA's generic diagnosis it appeared to me that his genus *Pseudoboodon* and my supposed new genus were identical, although his specimen, however, was specifically distinct from mine. The only modification of PERACCA's generic diagnosis, which ought to be made, is that the scales must be said to be disposed in 17—21 rows instead of only 21.

Synopsis of the species of the genus Pseudoboodon.

1. Scales in 17 rows, ventral shields 135—141, subcaudals 31—33 pairs; *Ps. albopunctatus.*
2. Scales in 19 rows, ventral shields 149—152, subcaudals 16—21 pairs; *Ps. brevicaudatus.*
3. Scales in 21 rows, ventral shields 196—198, subcaudals 41 pairs; *Ps. Gascæ.*

Pseudoboodon albopunctatus. Spec. nov.

Plate I, figure 2, 3, and 4.

Hypapophyses distinctly developed even on the posterior part of the vertebral column. Maxillary bone not angularly bent, with 19 solid teeth; the five anterior of these very enlarged, separated by a distinct interspace from the small posterior ones, which are closely set, decreasing in size behind and in the specimen examined 14 in number. Anterior six to seven mandibular teeth strongly enlarged and in a continuous series with the much smaller posterior ones, which decrease in size behind being about equal in number. Head elongate, depressed, distinct from neck, with a sharp canthus rostralis between the upper face and the vertical sides. In front of the eye there is an elongate deep loreal pit, extending between the front margin of the eye and the nasal shield, the bottom of which chiefly consists of the elongate concave loreal shield and, on a narrow rand at the eye, of the narrow lower præocular. The upper margin of the pit is formed by the elongate superior præocular, which is bent over the opening, partly covering it, and by the præfrontal; below the pit is bordered by the second and third upper labials. The eye half the length of its distance to the snout, with a round pupil. Rostral just visible from above, much broader than deep. Two internasals broader than long, considerably smaller than the large præfrontals, which also are broader than long. Nostril in a semidivided nasal. Loreal elongate and concave; two præoculars, the lower vertical, high, and narrow, the upper horizontal, elongate, and narrow, together forming a right angel at the upper posterior corner of the loreal pit. Frontal hexagonal, contracted behind, $1^1/_4$ as long as broad. Supraoculars as broad as the middle of the frontal. Postoculars two; temporals 1 + 2; upper labials 7, third, fourth, and fifth entering the eye. Lower labials 7—8; three or four of them in contact with the anterior chinshields, which are short and broad in conformity with the posterior. Body stout, cylindrical. Scales smooth, in 17 rows, without apical pits, the vertebral row not enlarged. Ventral shields 135—141; anal entire. The tail short, conical, with 31—33 pairs of subcaudals.

Above brownish black, a little lighter on the sides; each scale with numerous small white dots. The head is a little more brownish than the body, each shield with small white dots. On some of the upper and lower labials there is a distinct white ocellar spot. The ventrals and the subcaudals paler brownish with dark edges and white oblong spots, each of these not occupying more than a single ventral or subcaudal shield. On the specimen N:o 2066 the white ventral spots are very distinct and numerous, on the other two they are distinct on the sides of the shields but disappear on the middle parts.

Measurements and numbers of the shields of the specimens.

Catalogue number.	2066. ♂.	2064. ♂.	2065. ♂.
Total length	382 mm.	430 mm.	425 mm.
Length of the tail	60 »	70 »	71 »
» of the head to the hind margin of the parietals	15 »	16 »	15 »
Greatest breadth of the head	12 »	12 »	11 »
Longitudinal diameter of the eye	3,5 »	3,6 »	3,5 »
Distance from the eye to the snout	6,2 »	7 »	6,5 »
Number of the ventrals	135	135	141
» » subcaudals	31	32	33

Pseudoboodon brevicaudatus. Spec. nov.

This species, which also is represented by three specimens, agrees completely with the preceding except in following points: The rows of scales are 19; the ventrals 149—152, and the subcaudals 16—21 pairs. The lower labials are eight in number in all specimens, four of these bordering the anterior chinshields, which always are longer than the posterior. The tail is shorter and of an other shape, tapering gradually from the base to the end. (In *Ps. albopunctatus* the tail is nearly of the same thickness, rapidly contracted at the point.)

The species seems to vary in colour by age. The ground colour in all three specimens is brownish black as in the preceding species, but in the little young specimen the head is pale brown with the same black edged white ocelli on the labials as in the preceding species. On the sides of the back of this specimen there are two rows alternating transverse light spots, and on the ventral shields as also on the scales we find the same white spots as in the preceding species. With increasing age the head becomes darker and the light spots dissapear with exception of the white ocelli on the labials. On the halfgrown specimen the head is still much lighter brown than the body and a few light spots are left on the ventrals, but on the great specimen the colour above, on the head as well as on the body, is dark olive brown, lighter brown on the sides and yellowish beneath with small indistinct white markings on the shields.

Possibly the preceding species also passes through that same stage of development in colour; all specimens however being halfgrown, as far as I can judge, it is impossible to decide the matter. Such a variation in colour appears by the fact that on the smallest specimen the white dots on the ventrals are more numerous and more distinct than in the two other, but the head is rather darker than in these.

Measurements and numbers of the shields of the specimens.

Catalogue number.	2067 ♀	2068 ♀	2069 ♂?
Total length	670 mm.	320 mm.	240 mm.
Length of the tail	65 »	22 »	18 »
» » » head (Distance between the nose and the hind margin of the parietals)	22,5 »	13 »	11,5 »
Greatest breadth of the head	18 »	11 »	8,2 »
Longitudinal diameter of the eye	4 »	3 »	2,5 »
Distance from the eye to the snout	11 »	6 »	5 »
Ventrals	152	149	149
Subcaudals	21	16	16

Chlorophis carinatus. Spec. nov.

Among the collections of the museum from the West Africa there are five snakes, belonging to the same species, which I, though with some hesitation, refer to the genus *Chlorophis*, although they show some discrepancies from the forms of this genus. The specimens in question differ namely from these in having only 13 rows of scales and possessing a very great number (about 40) maxillary teeth, but in other respects they resemble this genus so closely, that I think it most correct to refer them to this one, especially as I have found in the few *Chlorophis*-specimens in the museum that the maxillary teeth are more than 25, which number BOULENGER states as maximum for the genus Chlorophis.

The new species, to which I adopt the name »*carinatus*» on the ground of the distinct keels on the ventrals, seems to come nearest to *Chlorophis heterodermus* HALLOW., from which it differs only by above mentioned characters. For the sake of completeness I give, however, in the following a brief diagnosis of the new species.

Maxillary teeth about 40, increasing in size behind and forming an uninterrupted series; mandibular teeth numerous, sligtbly decreasing in size behind; all teeth solid. Head elongate, distinct from neck. Eye large, $^3/_4$ of its distance to the tip of the snout; pupil round. Rostral broader than deep, well visible from above. Internasals as long as or slightly shorter than the præfrontals. Frontal pentagonal, twice as broad in front as behind, as long as or slightly shorter than its distance to the tip of the snout, shorter than the parietals, about as large as the supraoculars. Nostril lateral, large, between two nasals. Loreal longer than deep. One præocular, nearly reaching the frontal. Two postoculars (one on the one side of a specimen and four on the one of another). Temporals 2+2 or 1+2 (on the smallest specimen the temporals are 2+3 on one side, 3+2 on the other). Nine or ten upper labials, fourth, fifth, and sixth or fifth, sixth, and seventh entering the eye. Five lower labials in contact with the anterior chin-shields, which are longer than the posterior. Body elongate, cylindrical. Scales smooth, in 13 rows with apical pits, disposed somewhat oblique on the anterior part of the body. The vertebral row not enlarged, the outermost row slightly larger than the other. Ventrals with a distinct keel and a very small notch on each side; 146—162 in number. Anal entire. Tail long, tapering in a long point; subcaudals 83—97 pairs, without keels and notches. Olive or green above (blue when the epidermis is lost); the young with dark cross bars which disappear more or less with age. Yellowish green beneath.

Four of the specimens belong to the collections of Messrs. KNUTSON & VALDAU, the fifth also is from Cameroon, received by Mr. KNÖPPEL in 1886.

Measurements and numbers of the shields of the specimens.

Catalogue number.	1972 ♀.	1973 ♂.	1974 ♀.	1975 ♂.	1976 ♀.
Total length	700 mm.	595 mm.	815 mm.	300 mm.	730[1] mm.
Length of the tail	200 »	175 »	215 »	75 »	150[1] »
Length of the head (distance between the nose and the hind margin of the parietals)	15 »	14 »	17 »	11 »	17 »
Greatest breadth of the head	9 »	9,6 »	11 »	7 »	11 »
Longitudinal diameter of the eye	5 »	4.3 »	5 »	3,5 »	5,2 »
Distance from the eye to the snout	6,2 »	5,8 »	7 »	4 »	7 »
Number of ventrals	146	153	162	155	161
» » subcaudals	88	97	83	83	—[1]

Thrasops splendens. Spec. nov.

Plate I, figure 8.

Maxillary teeth 22 or 23, the three posterior very enlarged and by a short interspace separated from the other, which are small and equal in size. Mandibular teeth about 20, decreasing in size behind. All teeth solid. Head large, very distinct from neck. Eye large, $^{4}/_{5}$ of its distance from the tip of the snout; pupil round. Rostral much broader than deep, well visible from above. Internasals as long as broad, the suture between them as long as that between the præfrontals, which are considerably broader than long. Frontal hexagonal, nearly twice as broad in front as behind, as long as its distance from the tip of the snout and sligthly shorter than the parietals, about as large as the supraoculars. Nostril lateral, very large, in the posterior part of a semidivided elongate nasal. Loreal elongate, twice as long as deep. One præocular, high and narrow, not reaching the frontal. Two postoculars, narrow and falciform, the inferior reaching to below the eye. Temporals 1 + 2; the superior of the two posterior very large and similar to a posterior parietal.

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[1] The tail mutilated.

Eight upper labials, fourth and fifth entering the eye. 7—10 lower labials, four or five in contact with the anterior chin-shields, which are shorter than the posterior, behind which there are two large scales resembling a third pair of chin-shields. Body elongate and compressed. Scales in 17 rows, unequal in size. The scales of the vertebral row very enlarged, as broad as long, in one specimen very strongly keeled, in the other slightly keeled or smooth. The scales of the sides narrow, oblique, and overlapping, smooth except on the posterior part of the body of one of the specimens. In the two outer rows the scales are broader but not longer than on the sides and smooth or very indistinctly keeled except in the mentioned keeled specimen, there all the scales are keeled at least on the posterior parts of the body. Ventral shields 170—178, angulate laterally, with a faint trace of a keel on the sides in one of the specimens, smooth in the other. Anal divided. Tail long, gradually tapering in a long narrow point. Subcaudals 135—145 pairs.

Upper parts variegated with black and green or blue. The head pale green with black margins on the shields. The scales of the vertebral row black with a blue longitudinal stripe on the middle. The scales on the sides are blue in the centre and black on the margins; the blue colour predominating in the outer rows, the black in the inner. On the tail the blue centres of the scales confluent into four narrow stripes on the black groundcolour. Lower parts pale green with a light longitudinal streak on each side of the ventrals. On the tail the inner margins of the subcaudals are more or less black, forming a median black line, which becomes more distinct at the point. On the specimen with the strong keels on the scales the blue colour becomes green when covered of the in this specimen very thick epidermis. When the epidermis is lost, the colour is blue as in the other specimens.[1]

In the museum we find four specimens, all from Cameroon, being received from three different collections. N:o 1978 belonged to the above mentioned collection of Messrs. KNUTSON and VALDAU from Mapanja, N:o 1979 from Bibundi, N:o 1980 is received 1886 by mr. KNÖPPEL and N:o 1977 by Dr. JUNGNER, bought in 1892.

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[1] Possibly one might presume the epidermis to be lost in the other specimens, but this is not the case, being, however, in those rather thin.

Measurements and numbers of the shields of the specimens.

Catalogue number.	1977 ♂.	1978 ♀.	1979 ♀.	1980 ♀.
Total length	1330 mm.	1320 mm.	1470 mm.	1430 mm.
Length of the tail	475 »	390[1] »	520 »	470 »
Length of the head to the hind margin of the parietals	22,5 »	22 »	24 »	22 »
Greatest breadth of the head . . .	15,8 »	13 »	16 »	14 »
Longitudinal diameter of the eye .	7 »	8 »	8 »	7,2 »
Distance from the eye to the snout	9,5 »	9 »	11 »	10 »
Number of ventrals	174	178	175	170
» » subcaudals	145	100[1]	141	135

Leptophis flagellum. Spec. nov.

Plate II, fig. 12, 13, and 14.

Maxillary teeth 27, solid; the two posterior enlarged and separated from the small subequal anterior ones by a short interspace. Mandibular teeth small, numerous, about 30, decreasing in size behind. Head depressed, distinct from the neck. The snout broad and flattened. Eye moderate, half the length of its distance from the tip of the snout. Pupil round. Rostral twice as broad as deep, just visible from above. Two internasals, as long as their greatest breadth at the hind margin. Two præfrontals, scarcely broader behind than in front, a little longer than the internasals. Frontal elongate, pentagonal, slightly narrower behind, a little longer than its distance from the end of the snout, but distinctly shorter than the parietals. Nostril lateral, pierced in the centre of an oblong entire nasal. Loreal elongate, $2^1/_4$ as long as deep, one præocular, not reaching the frontal, narrowed at the base. Two postoculars; temporals 1 + 2; eight upper labials, fourth and fifth entering the eye; lower labials eight on the one, ten on the other side; the middle ones considerably greater than the posterior and anterior. Four or five in contact with the elongate anterior chinshields, which are as long as and broader than the posterior.

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[1] The tail is mutilated.

The body slender, cylindrical, very long and narrow, tapering in a long and thin tail. Scales in 15 rows, elongate and narrow, on the anterior part of the body obliquely disposed, all smooth, but striated. The median row enlarged. Ventral shields 157, without keels and notches. Anal divided; subcaudals 169 pairs.

The groundcolour above pale brown, each scale with numerous copper-coloured dots and stripes, beside which there are greater black irregular dashes dispersely spread over the body. Beneath the darker copper colour is the ground colour, the shields all marbled with ligth and black. The throat light, with a dark spot on the middle of each shield. Where the epidermis is lost, the snake is white with a tinge of red and sprinkled with black. The head above dark brown, speckled with black, beneath yellowish white. The first, second and third upper labials are brown with the inferior anterior corners white, the fourth, fifth, and half the sixth white with brown spots, and half the sixth, the seventh and the eighth brown. There is no dark streak behind the eye.

In colour this species seems to agree very closely with *Leptophis cupreus* (Cope), but differs in the want of the dark streak behind the eye, the smooth scales, the single enlarged vertebral row, and the not *»unusually short broad head»*. From *Leptophis depressirostris*, with which it agrees in the smooth scales, it differ in the colour, the enlarged vertebral row, eight upper labials etc.

The specimen in question belongs to the collections, above mentioned, received in 1862 from Dr. Touzet at Rio Janeiro, wherefore Brasilia probably is the patria of the new species.

One single specimen, which is a female.

Total length	1005	mm.
Length of the tail	415	›
Length of the head to the hind margin of the parietals .	12	›
The greatest breadth of the head	7,5	›
The longitudinal diameter of the eye	2,2	›
Distance from the eye to the snout	5	›

Arrhyton Quenselii. Spec. nov.

Plate I, figures 5, 6 and 7.

In the Royal Museum there are kept from an earlier period three snakes, named *Coluber Petola*, L. They are all labeled and probably determined by Professor C. QUENSEL, who was Director of the museum of the R. Academy of Science from 1799 to 1806. In his catalogue of 1802 we find them stated without indication of locality or collector and very probably the must have been in the museum before his time. Externally the three specimens seem to correspond fairly well — QUENSEL also says: »*Nostra exempla pallida et nullo modo dissimilia*» —, but on closer examination we find, that they belong to two genera far removed from each other. The one specimen namely is an *Oxyrhopus petolarius*, the present name for LINNÆUS's *Coluber petolarius* as well as for his *Coluber Petola*, and then correctly named by QUENSEL, but the two other specimens, though, as mentioned above, in colour and external appearance very similar to the former (all being rather discoloured), differ from this one in many important points. QUENSEL already observed the great difference in number of ventral and subcaudal shields, which, however, he did not believe would cause any separation of the snakes into different species. The characteristic dentition, very unlike that of *Oxyrhopus petolarius*, indicates that the specimens in question ought to be put down under the genus *Arrhyton*, Günther, where they then would represent a species hitherto not described, to which I propose the name *A. Quenselii* in memory of Professor QUENSEL, whose magnificent catalogue with its brief but distinct notes on the reptiles of the Royal Museum is of uncountable value for the reviser of the collections.

Hypapophyses absent in the posterior dorsal vertebræ. Palatine and pterygoid teeth few, sparsely sitting, but distinct. Maxillary teeth ten, the eight anterior small, equal in size, closely set, after a considerable interspace followed by two strongly enlarged and compressed, blade-like fangs. All solid. Mandibular teeth about equal in number, but all small and forming an uninterrupted series. Head scarcely distinct from neck; eye small, half the length of its distance to the tip of the snout, with vertically subelliptic pupil. Snout conical, not depressed. Rostral broader than high, well visible from above. Two internasals and two præfrontals, the suture between the former considerably shorter than that between the latter. No loreal, præfrontal in contact with second labial. Nostril between two nasals, the anterior of which is expanded in front and wedged in between the rostral and the first upper labial. A single præocular, not reaching the frontal, which is very broad, nearly as broad as long, as long as its distance to the tip of the snout, but shorter than the parietals. The supraoculars narrow, expanded behind. Two postoculars; temporals 2 + 2. Upper labials six; third and fourth entering the eye; six or seven lower labials, four of which are in contact with the anterior chinshields, which are considerably larger than the posterior. Body stout, cylindrical; scales in 17 rows, smooth, without apical pits. Ventral shields 153—157; anal entire. Tail moderate, tapering in an acute point, with 63—67 pairs of subcaudals.

As mentioned above the colour is bleached. The whole snakes are yellowish-white except the upper surface of the head and a broad band on the neck behind the occiput, which are brown. Possibly, a few brown blotches on the back are a relict of other dark cross-bars, now discoloured. A specimen of *Oxyrhopus petolarius*, also bleached, and preserved from the same time, is very similar in colour to these snakes, wherefore it is possible that the colour of this *Arrhyton*-species corresponds with that of *Oxyrhopus petolarius* with its alternating dark and light cross-bars.

As mentioned above there is no statement given about the patria of these snakes neither when or how they came to the museum, but probably they have as also their nearest relations come from the West India, where this form, however, must be very rare, considering the fact that no more than these specimens seem to have been met with. It seems strange that the species has not been obtained and described during all the scientific explorations of the nineteenth century but, as far as I can see, this is the case. Although many trials I have still not succeeded in identifying this with any previously described form. Though externally resembling *Oxyrhopus* the form of the teeth does not allow its arranging under this genus. Even from *Arrhyton* it differs on account of the pupil and the presence of *two* large fangs, but in other respects it agrees so well with this genus and especially with *A. tæniatum*, Gntr. that I do not think I make any mistake when referring it to this genus. In the Cat. of Sn. the *Arrhyton*-species are, described as being yellowish with a brownish head and three dark longitudinal lines. If the mentioned brown spots I find in these specimens are remains after longitudinal lines instead of transversal ones, which latter is presumed in the diagnosis as in my opinion more probable, the colour also would correspond with the typical colour of the genus.

Measurements and numbers of the shields of the specimens.

Catalogue number.	1191.	1192.
Total length	420 mm.	480 mm.
Length of the tail	98 »	120 »
Length of the head to the hind margin of the parietals	11,8 »	12 »
Greatest breadth of the head	9 »	9,5 »
Longitudinal diameter of the eye	2,2 »	2,4 »
Distance from the eye to the snout	5 »	5 »
Number of ventrals	157	153
» » subcaudals	63	67

Tropidodipsas longicaudata. Spec. nov.

Plate II, fig. 9, 10, and 11.

Maxillary teeth 15, solid, in an interrupted series, rather small, a little decreasing in size behind. Mandibular teeth about 14, decreasing in size behind. Head very distinct from neck; eye moderate, the horizontal diameter as long as the distance to the nostril and $1^{1}/_{3}$ as long as the distance to the snout; pupil vertical. Rostral twice as long as broad, just visible from above. Two internasals a little broader than long, considerably smaller than the præfrontals. Nostril lateral, between two nasals. Loreal nearly twice as long as deep, not reaching the eye. Frontal hexagonal, longer than its distance to the tip of the snout and slightly shorter than the parietals. One præocular, not reaching the frontal. Two postoculars; temporals 2 + 3. Eight upper labials, the fourth and fifth entering the eye; the sixth and seventh being the largest. Eight lower labials, four of which are in contact with the anterior chinshields, which are longer than the posterior.

Body elongate and compressed, especially the anterior part. Scales in 19 rows, all smooth and equal in size, without apical pits. Ventral shields 225, anal entire. Tail long, nearly one fourth of the total length, gradually tapering to the narrow end; subcaudals 101, in two rows.

Colour above brownish and greyish white by numerous more or less regular, broad, brown, dark edged, crossbands, alternating with narrower light ones. The brown crossbands are broadest on the back, where the sometimes merge into each other. On the sides they are contracted, wherefore the white-greyish colour there is more expanded. Lower parts yellowish white, marbled with dark. The head above light brown with dark distinct spots on the shields. Behind the eye a broad dark edged brown band, extending to the eighth upper labial. The head below, the upper labials and the throat yellowish white with dark dots on the labials.

The single specimen of this new form also belongs to the collections from Dr. Touzet at Rio Janeiro, which collections are said to be from Brasilia. Probably the north part of that country is the patria of this snake, all other species of the genus *Tropidodipsas* being from Mexico and Central America.

The specimen is a female.

Total length	920 mm.
Length of the tail	220 »
» » head (distance between the nose and the hind margin of the parietals)	15,8 »
Greatest breadth of the head	14 »
Horizontal diameter of the eye	3,6 »
Distance from the eye to the tip of the snout	6 »

Geodipsas mapanjensis. Spec. nov.

Plate II; fig. 15.

Solid maxillary teeth 16, equal, followed, after a distinct interspace, by two enlarged grooved fangs. Mandibular teeth small, about 20, slightly decreasing in size behind. Head distinct from neck; eye small, two thirds of its distance from the tip of the snout; pupil round. Rostral considerably broader than deep, just visible from above. Two internasals, broader than long, half as long as the præfrontals, which are longer than broad. Nostril lateral, between two nasals. Loreal as deep as long. Frontal pentagonal, slightly longer than its distance to the snout; $1^1/_3$ as long as broad, twice as broad as the supraoculars. Two præoculars, the lower deep and narrow, the superior broader than deep, not reaching the frontal. In one of the specimens the lower præocular is divided into two on one side. Two postoculars; temporals 1 + 2; parietals large, as long as their distance from the tip of the snout; seven upper labials, third and fourth entering the eye. Eight or nine lower labials, four of which are in contact with the anterior chinshields, which are about as long as the posterior. Between these and the first ventral shield there is only one pair of scales, which are considerably large and may be considered as a third pair of chinshields. The body cylindrical, with 19 rows of scales, which are equal and distinctly keeled. In one of the specimens (the lighter one) all the scales are keeled but in the other the outer row is smooth. Ventral shields 138—149, anal entire. The tail short, sharply pointed[1]; subcaudals 40 in two rows.

The two specimens, there are in the Royal Museum, which in my opinion must be referred to the same species, differ considerably from each other in the colour. Although they belong to different sexes, it is not truly that this variation in colour may be regarded as a sexual distinction, hitherto not mentioned among the snakes; more probably the two specimens represent two different colour-varieties of the same species, so very common in this order of the reptiles. In the figured specimen, which is a male, the ground colour of the upper parts of the body is light brownish grey with four rows of dark spots on the anterior part of the body, which spots behind confluent into fine dark stripes. The two median rows of spots, commencing just behind the occiput, are separated from each other only by the vertebral row of scales and are formed by small round to square dark-brown spots, which on the posterior third of the trunk confluent into two stripes, now also touching the vertebral scale-row. On the tail these stripes confluent into a fine median line. The outer row of spots commences further behind and grows to lines sooner than the median ones. They are separated from each other and from the median ones to the end of the tail. Half of each scale on the sides below this outer row of spots is light half dark, forming in this way indistinct longitudinal lines. The belly and the lower surface of the tail yellowish white with a longitudinal dark bar on the outer end of each ventral, which bars form a very distinct dark brown streak from the throat to the end of the tail. The head above dark brown, sprinkled with very small light dots. Behind the parietals there are two light spots separated from each other by an angle shaped dark marking. Upper labials white with dark margins. The head below yellowish white with dark sutures between the lower labials. Behind the angles of the mouth there is a bright white, large spot, below confluent with the light colour on the throat. The other specimen, which is a female, has a much darker ground colour, which causes that the dark lines and spots become more indistinct than in the first described specimen, although they exist on the same places in both forms. Even lower parts in this specimen are dark with light margins of the ventrals and light dots bordering the dark bars on the ends of the shields. On the throat the colour becomes lighter, and the whole head is of the same colour as in the light specimen.

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[1] In the melanotic specimen the tail is obtuse and the number of subcaudals only 30 pairs; probably the tail of this specimen is mutilated.

This new species seems to come nearest to *Geodipsas Boulengeri*, (Peracca), from which however it is distinguished by the keeled scales, the single loreal, the two præoculars, the colour, and the geografical distribution, *G. Bou-*

lengeri being from Madagascar and this form from the West Africa.

The specimens belong to the same collection as the specimens of the genus *Pseudoboodon*, mentioned above, being received from Mapanja, Cameroon, by Messrs. Knutson and Valdau.

Measurements and numbers of the ventral and caudal shields of the specimens.

Catalogue number.	2071 ♀.	2070 ♂.
Total length	270 mm.	275 mm.
Length of the tail	33[1] »	45 »
Length of the head (distance between the nose and the hind margin of the parietals)	9,2 »	9 »
Greatest breadth of the head	6,2 »	5,5 »
Horizontal diameter of the eye	2 »	2 »
Distance from the eye to the snout	3,2 »	3,3 »
Number of the ventrals	149	138
» » subcaudals	30[1]	40

Aporophis lineatus (L.).

A colour-variety of this snake, which is to be found in the museum under the number 834, will be mentioned below. The lateral dark lines are remarkably broad, nearly as broad as the vertebral band and occupying the fourth, half the third, and half the fifth outer rows of scales. They are darker than the vertebral band, but the inner margin is lighter than the outer and the middle parts. In the normal states of things the lateral lines are very narrow, occupying only the median parts of the fourth outer row of scales. The specimen, having also a fewer number of subcaudals than stated in Boulenger's Cat. of Snakes, 67 pairs instead of 79—93, is from Uruguay, obtained by Mr. Åberg in 1886.

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[1] Possibly a little mutilated.

Urotheca lateristriga (Berth.).

A specimen, obtained in 1833 from Columbia, differs from the typical form of this species in the arrangement of the shields of the head. The loreal shield is considerably deeper than long, on one side divided into two superposed smaller loreals. Præ- and postoculars typical, on one side a little subocular. Posterior temporals 2 (instead of 1) and the single normal elongate anterior temporal is divided into two or three smaller shields. Upper labials on one side eight with the fourth and fifth entering the eye, on the other side nine with the fourth, fifth, and sixth entering the eye. Five lower labials in contact with the anterior chin-shields. By the posterior temporals and by five lower labials entering the anterior chin-shields the specimen seems to be allied to the other Columbian species of this genus, *Urotheca euryzona* (Cope), with which it also agrees in having only 126 ventral shields. Subcaudals are only 68, but the tail is mutilated. In colour the specimen is a typical *Urotheca lateristriga* and seems thus to be an intermediate form between the both Columbian species of the genus *Urotheca*, wherefore I think it ought to be mentioned.

Contia æstiva (L.).

In the Cat. of Snakes *Boulenger* states the scale-rows of this snake to be 15. Of the ten specimens, however, there are preserved in the R. Museum, no less than nine have 17 rows of scales on the anterior half of the body, only one has 15. On the posterior part the rows are 15, viz. 13.

Oxyrhopus cloelia (Daud.).

In the Catalogue of Snakes, part III, p. 110, London 1896, BOULENGER states a new species of the genus *Oxyrhopus*, *O. maculatus*, from Uruguay, said to be different from the farther north *Oxyrhopus cloelia*, by having 51 instead of 64—93 pairs of subcaudals, narrower frontal shield and light spots on the dark ground colour above. The Royal Museum received in 1891 from Uruguay by the engineer Mr. A. E.

KULLBERG a fine specimen of a typical *Oxyrhopus cloelia* but with 57 pairs of subcaudals only. Thus, it is clear that this species lives so far south as in that country and also that its subcaudals sometimes are fewer than stated by BOULENGER (the tail is not mutilated). I therefore believe that the species *Oxyrhopus maculatus* Boul. is only a colour-variety of the typical *Oxyrhopus cloelia* (Daud.).

Oxyrhopus carinatus (Schneid.).

Two Brasilian species, belonging to the mentioned collections from Dr. TOUZET at Rio Janeiro, differ from the description in Cat. of Snakes by having 69—71 subcaudals instead of 80—97.

Erythrolamprus fissidens (Gntr.).

There is in the museum a fine colour-variety of this snake, which I have not seen mentioned before. The colour above is uniform brown-black with the two light narrow lines, which we find in the typical form only above the eyes and on the upper face of the neck, extending over the whole back of the snake as far as to the point of the tail, where they confluent into each other. Lower parts and the 2½ outer rows of scales white. The head below sprinkled with brown. On both sides there is one præocular with a small subocular below. The number of the ventrals is greater than stated in BOULENGER's Cat. of Snakes, 157 instead of 117—140, but in all other respects the specimen is a typical *Erythrolamprus fissidens* (Gntr.).

The snake is collected by Dr. C. BOWALLIUS 1883 in Central America, R. Omotepe, Nicaragua.

Miodon gabonensis (A. Dum.).

In the last edition of *Catalogue of Snakes* in the British Museum we find stated three *Miodon*-species (part III, p. 251, 252), all from the West Africa, being very closely allied to each other, viz. *M. gabonensis* (A. Dum.), *M. collaris* (Peters), and *M. notatus* (Peters). In the Royal Museum there are twelve specimens of this genus, all received from Cameroon through Messrs. KNUTSON and VALDAU, Dr. JUNGNER and Dr. Y. SJÖSTEDT. When trying to determine these, I have come to the conclusion that the three above mentioned species must be regarded as one species, to which the oldest name *Miodon gabonensis* (A. Dum.) may be maintained.

Following table shows the differences presumed between the species. (After Boulenger's Cat. Sn.)

	M. collaris.	M. gabonensis.	M. notatus.
Number of ventrals .	201—228.	214—249.	181—200.
» » subcaudals	16—22.	16—24.	14—18.
Internasals	considerably shorter than the præfrontals.	as long as or sligthly shorter than the præfrontals.	as in M. gabonensis.
The eye	$^3/_5$ of its distance to the tip of the snout.	$^1/_3$—$^1/_2$ of its distance to the tip of the snout.	$^1/_2$ of its distance to the tip of the snout.
Frontal	$1^1/_2$ as long as broad.	$1^1/_3$—$1^1/_2$ as long as broad.	sligthly longer than broad.
Nasal	divided.	entire or imperfectly divided.	divided.
Temporals	1+1 (or 1+2).	1+1.	1+1.
Lower labials in contact with the anterior chinshields .	4—5.	4.	3.

The most important differences between the species would be the different number of the ventrals and the length of the internasals compared with that of the præfrontals. To judge from the number of the ventrals there should be eight *M. notatus* (182—200 ventrals), three *M. collaris* (206, 207, 211 ventrals) and one *M. gabonensis* (229 ventrals) among the specimens in the museum. At the first glance on the specimens we find that such a distribution of them is an unnatural one. The relation between the internasals and the præfrontals is very varying in the same group. Among the »collaris»-forms we find the internasals well as long as those among the »notatus» and »gabonensis»-forms. Thus, it is clear that the above mentioned chief-characters ought not to be employed, when separating the species from each other. Regarding the number of subcaudals, *M. notatus* should have no more than 18. There are two specimens with 18 or less subcaudals (15, 18) but both these have more than 200 ventrals (206, 211), wherefore they ought not to be *M. notatus;* besides, all the eight specimens with less than 200 ventrals have more than 18 subcaudals.

Other specific characters, mentioned, in the table, are so very unimportant or so individually varying that they cannot be of any value. In all the specimens there are four lower labials in contact with the anterior chinshields; the nasal is entire or divided without any order and the frontal varies in length also without any constant rule.

In colour eleven of the specimens correspond so well that any trace of specific difference in this respect is not to be found. They are all »black above and on the sides down to the outer end of the ventrals and subcaudals» with the dark colour sharply distinct from the yellowish-white belly. In two of them (two small ones) the occipital part of the neck and the head above are light brown, except the præfrontals, the frontal, the anterior part of the parietals and a spot below the eye, which are black. In the other specimens the head is black-brown with the above mentioned parts darker. Probably the light head is a juvenile character. A single specimen differs in colour by having the upper parts greybrown instead of black, and this colour confluents without distinct limits with that of the belly. To judge from the diagnoses in Cat. of Snakes, however, it is not rare that the specimens vary in colour.

Following table shows the variation of the presumed specific-characters» in the specimens examined.

Catalogue number and locality.	Total length.	Number of ventrals.	Number of subcaudals.	Length of the suture between the internasals.	Length of the suture between the præfrontals.	
N:o 1509. Bibundi.	585 mm.	207	19 pairs.	1,8 mm.	2,2 mm.	
» 1510.	650 »	227	19 »	1,9 »	2,2 »	The light specimen.
» 1511. Mapanja	480 »	189	21 »	1,8 »	2,5 »	
» 1512. »	550 »	185	21 »	2 »	2,2 »	
» 1513. »	520 »	191	18 »	2 »	2,2 »	
» 1514.	450 »	187	20 »	1,8 »	2,2 »	
» 1515. »	540 »	206	18 »	1,8 »	2,1 »	The head rather brown.
» 1516. »	480 »	213	15 »	1,7 »	2,4 »	
» 1517. »	405 »	192	21 »	1,3 »	1,8 »	The head brown.
» 1518. »	475 »	181	22 »	1,8 »	2,2 »	
» 1519. »	358 »	186	21 »	1,7 »	1,9 »	The head brown.
» 1520. Cap Debundscha . .	455 »	200	16	1,5 »	2,5 »	

List of Plates.

Plate I.

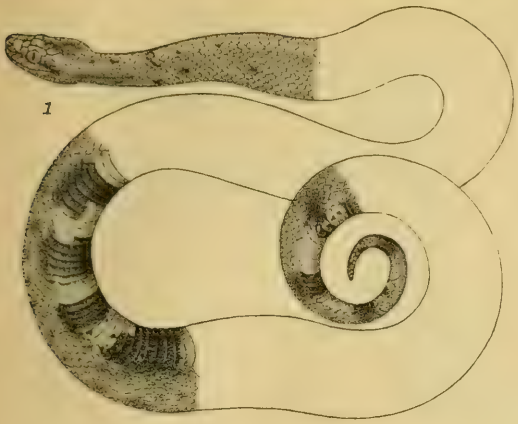
(All figures in natural size except Fig. 7, which is enlarged [× 2].)

Fig. 1. *Ungalia brasiliensis* sp. nov.
» 2—4. *Pseudoboodon albopunctatus* sp. nov.
» 5—7. *Arrhyton Quenselii* sp. nov.
» 8. *Thrasops splendens* sp. nov.

Plate II.

(All figures in natural size.)

Fig. 9—11. *Tropidodipsas longicandata* sp. nov.
» 12—14. *Leptophis flagellum* sp. nov.
» 15. *Geodipsas mapanjensis* sp. nov.



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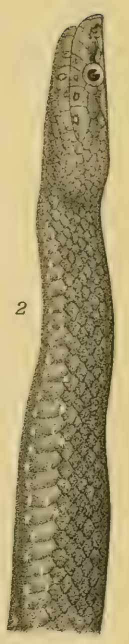

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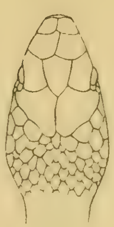

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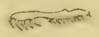

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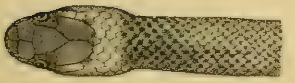

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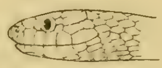

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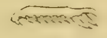

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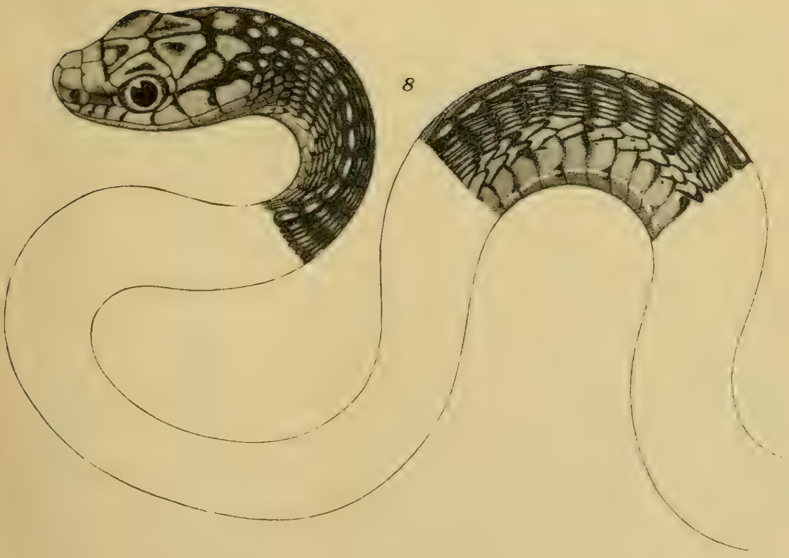

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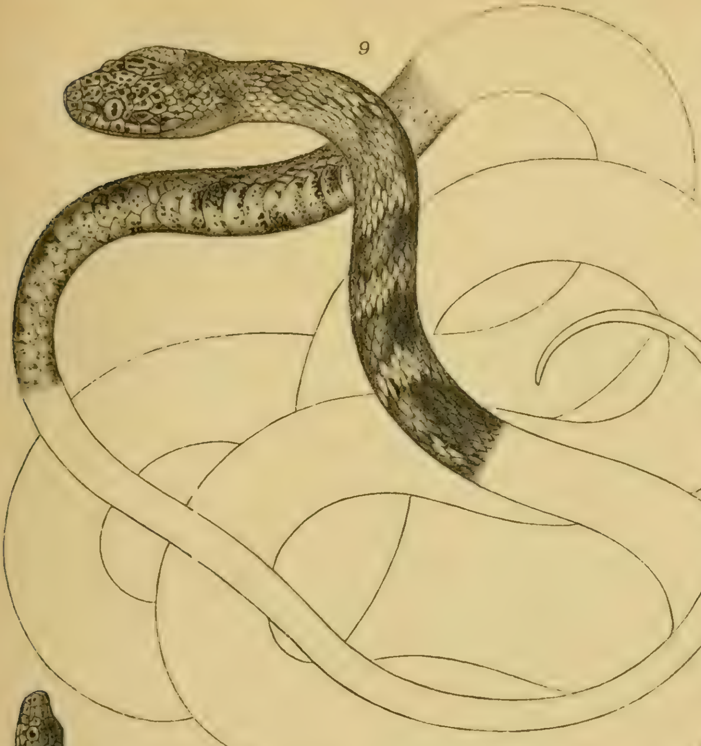
Ljustryck af Chr. Westphal, Stockholm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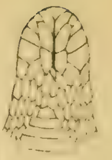
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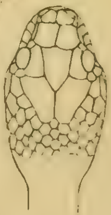
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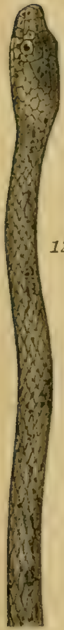
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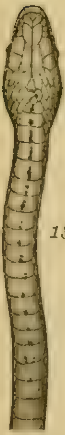
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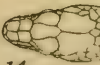
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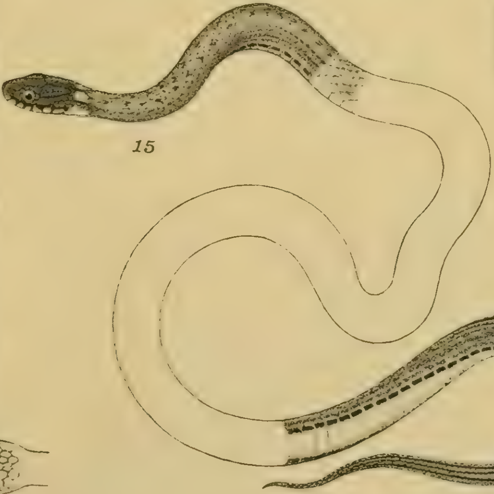
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A. Österberg del.

Ljustryck af Chr. Westphal, Stockholm.

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 6.

ON
A SINGULAR CASE OF HERMAPHRODISM
IN
HOLOTHURIDS.

BY

HJALMAR THÉEL.

WITH TWO PLATES.

COMMUNICATED 8 MAY 1901.

STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1901

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The destruction and resorption of eggs and tissues . . . . . p. 30.
Summary . . . . p. 35.

The investigations which form the subject of the present paper were carried on during a summer-stay, several years ago, at the Swedish Marine Biological Station, Kristineberg. I then observed that the Mesothuria intestinalis (Ascan.), one of our common west-coast species of Holothurids, was a hermaphrodite, but in a manner quite different from that known before in this group of animals.

For a long time occupied with studies on the development of the organ-systems in the Echinidea, and being almost entirely engaged in pressing business at our state-museum, I did not publish anything about this discovery. In 1896, Dr Hj. Östergren[1] published an account of his studies on the sub-family Synallactinæ, where he established the hermaphrodism in the species in question. Consequently he was the first to make public anything about the union of the two sexes in the same individual of Mesothuria intestinalis. I may be allowed here to quote his own words: "Die Genitalschläuche sind alle entweder männliche oder weibliche, die Tiere werden aber dadurch zu Zwittern, dass beiderlei Arten beisammen vorkommen, die weiblichen mitunter etwas zahlreicher (10—15) als die männlichen. Beiderlei Schläuche erreichen, völlig gereift, etwa ein Drittel der Körperlänge des Tieres, sie reifen aber ungleichzeitig heran; demnach sind die weiblichen klein, wenn die männlichen gross sind, und umgekehrt. Die Eier sind rot, weshalb die reifen weiblichen Geschlechtsschläuche durch die Körperwandung hindurchschimmern, und zugleich sehr gross (gereift mehr als 0,5 Mm.), so dass sie bereits zur Zeit der männlichen Geschlechtsreife mit blossem Auge zu sehen sind. Infolgedessen wird man die Zwitterigkeit leicht gewahr. Eine nähere Beschreibung der Geschlechtsteile von Mesothuria intestinalis durch Herrn Professor Théel steht in Aussicht. Derselbe hat gleichfalls in diesem Jahre, und zwar früher als ich, die Zwitterigkeit bei diesem Tiere beobachtet."

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[1] Zur Kenntniss der Subfamilie Synallactinæ unter den Aspidochiroten. — Festskrift Wilhelm Lilljeborg tillegnad på hans åttionde födelsedag af svenske zoologer. Upsala 1896.

If we take into consideration that this is really the only positive information on hermaphrodism in the pedate Holothurids and, besides, that we are greatly in want of a more detailed description of the genital organs in this group af animals, it is thought that the following communication may be of some interest and may contribute, to a certain extent, to widen our present knowledge of the subject.

It is a well known fact that several of the apodous Holothurids, for example Synapta digitata (Mont.), Synapta inhærens (O. F. Müller), and probably also several other species belonging to this genus are hermaphrodite, and for a long time it was supposed that all the forms of the Synaptidæ had the two sexes united in the same individual. Later on it was proved by several investigators that this is not in conformity with the truth, but, that, on the contrary, the sexes are distinct in many forms of apodous Holothurids. If we neglect the family Molpadidæ which probably has the sexes separate,[1] all the Holothurids provided with feet are considered to have the sexes distinct, except Ananus holothurioides and Ocnus javanicus which, according to Sluiter,[2] are hermaphrodite.

Nevertheless, Ludwig of Bonn,[3] our best authority respecting the echinoderms, has pronounced in his splendid description of the "Seewalzen", that these very cases are unsatisfactorily known and are greatly in want of further investigation. It is true that Sluiter has not given reasons enough for his interpretation, which may be understood from the following citation taken from his paper, "Ueber einige neue Holothurien von der Westküste Java's." Here he says with regard to Ananus holothurioides: "Einige dieser Follikel sind männliche und einige weibliche Zeugungsorgane. Welche aber männlich welche weiblich sind, ist äusserlich nicht zu entscheiden" — — — "Ueber den histologischen Bau, die Eier und das Sperma, kann ich leider nichts Bestimmtes mittheilen." And, as far as concerns the reproductive organs of Ocnus javanicus he adds: "Sie bilden ein Bündel kürzerer und längerer einfachen, nicht verästelten Schläuche. Die kürzeren sind die Zeuger der Spermas, die längere sind die weibliche Zeugungsorgane." From these citations it becomes evident that SLUITER has not undertaken a careful histological examination of the objects, and that LUDWIG is right, when he closes his examination of the hermaphrodite Holothurids and of those possessing distinct sexes with following declaration: "Solange demnach der Beweis für das Gegentheil nicht mit aller wünschenswerthen Sicherheit erbracht ist, werden wir alle Holothurien mit alleiniger Ausnahme eines Theiles der Synaptiden als getrenntgeschlechtliche Thiere ansehen müssen."

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[1] Ludwig, H., Die Seewalzen. — Bronn's Klassen und Ordnungen des Thier-Reichs. II, 3, p. 182. Leipzig 1889—1892.

[2] Ueber einige neue Holothurien von der Westküste Java's. — Natuurkundig Tijdschrift voor Nederlandsch-Indië. XL. Batavia 1881. With 7 plates.

[3] l. cit., p. 183.

Nevertheless, it may not be impossible that the views of SLUITER are correct, so much the more as my own investigations of the reproductive organs of Mesothuria intestinalis point in this direction.[1]

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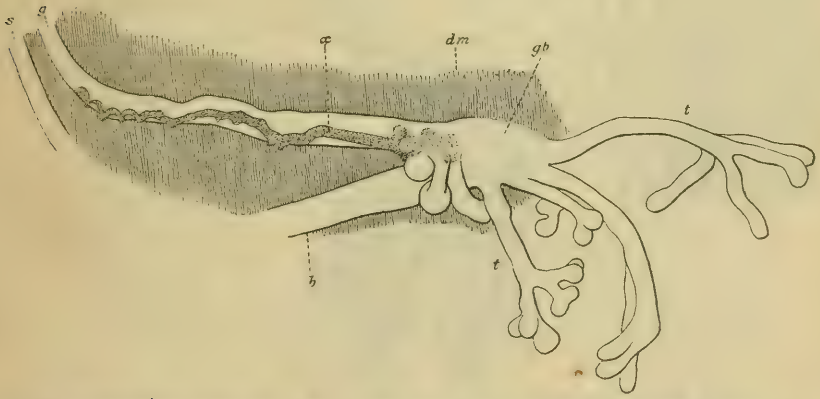
[1] Respecting the hermaphrodism in other pedate Holothurids, it ought of course to be very rare and I am convinced that most of them have the sexes separate. On the other hand, the genitalbasis of Mesothuria verrillii (Théel), Holothuria scabra Jæger and Holothuria vitiensis Semper, appear to be arranged in conformity with that in Mesothuria intestinalis.

The genital basis.

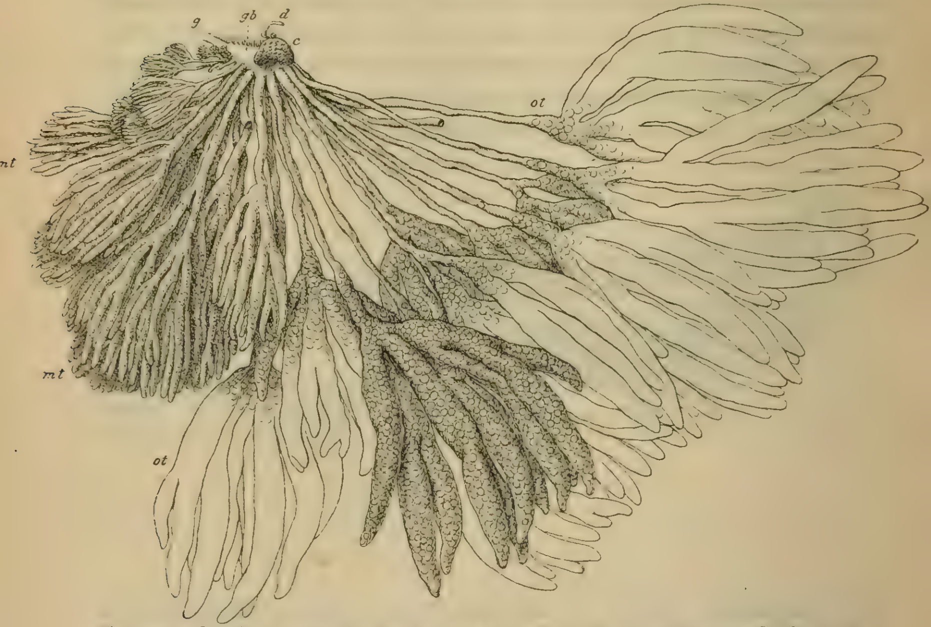
In Mesothuria intestinalis the efferent duct of the genital organ at first takes its way from the external pore in a downward direction close behind the madreporic canal and almost parallel to it (Pl. I, fig. 1—5). Attached to the dorsal mesentery, it then deviates from that canal, and runs almost straight backwards slightly above, and in a direction convergent to the rather important genital lacunar cord to which it is attached by two mesenteric membranes bounding the genital sinus of Semper. At their entrance into the genital basis, the efferent duct and the lacunar cord almost meet each other. The lacunar cord, in its turn, is strengthened by means of two membranes connecting it to the alimentary canal and forming the »Nebenschlundsinus» of Semper.



The reproductive organ of an individual, 40 mm. long. *g* efferent duct; *gb* genital basis; *t* young genital tubes: *dm* dorsal mesentery; *s* madreporic canal; *b* lacunar cord; *x* germinal cord. Highly magnified.

The genital duct opens into a rather spacious cavity situated within the genital basis and bounded by thick walls of a stroma of fibrous and lacunar structure. The cavity is lined with a ciliated epithelium and is in open communication with the cavities of the more or less elongated and ramified genital tubes which protrude from it.

In young individuals measuring three or four cm. in length, the genital basis presents itself as a very insignificant expansion at the left side of the dorsal mesentery, where the efferent duct enters it. The older the animal grows, the more the genital basis increases and finally it appears as a rather considerable prominence or swelling, projecting from the left side of the mesentery.



The reproductive organ of a full grown individual bent downwards from the dorsal mesentery. *g* efferent duct: *gb* genital basis: *c* posterior portion of the genital basis devoid of tubes but provided with small »maculæ» or minute protuberances: *d* a genital tube still not resorbed: *ot* nearly ripe ovarian tubes; *mt* immature male tubes. Magnified.

In an early stage of the development, the genital basis is devoid of every trace of a naked portion behind that part which carries the tubular genital appendages. But, during the growth of the animal, such a portion becomes visible by degrees and enlarges itself successively, forming at last a spiral or helicoid terminal-portion bent towards the dorsal mesentery and terminating in an obtuse or somewhat elongated tip. A closer inspection of it reveals that it bears on its surface small specks or "maculæ" of a yellowish brown colour, not seldom accompanied by minute protuberances and more or less cylindrical processes. A glance at the figures 1—5 on plate I will easily throw light upon these matters.

In order to give an exact idea of the arrangement and variations of these maculæ and protuberances, as well as of the bundles of genital tubes in different specimens, so as to make them comprehensible, it may be convenient to first quote some notes from my diary with reference to fresh materials.

Specimen 1. Caught July 9, 1900. Length about 170 mm.[1]

a. The posterior portion of the genital basis devoid of tubes has a length of 3 mm. and is provided with several yellowish maculæ and a couple of minute protuberances.

b. The genital basis immediately in front of the former portion carries 12 bundles of *male* tubes of a light flesh or even whitish colour measuring about 37 mm. in length.

c. The anterior portion of the genital basis protrudes 16 bundles of *female* tubes, those most posteriorly situated being the largest and having a length of about 15 mm. They are blood- or brick-coloured and are filled with larger and smaller eggs, with the exception of the six posterior bundles which are empty and irregularly swollen.

d. The foremost part, where the efferent duct issues, is provided with a series of very minute, scarcely 1 mm. long, cluster-like or unbranched globular tubes.

Specimen 2. Caught July 9, 1900. Length about 200 mm.

a. The posterior naked spiral portion of the genital basis measures 3,5 mm. in length, and is marked with twenty light brown maculæ and, anteriorly to these, an equal number of small obtuse prominences.

b. The portion immediately in front of the former, carries 22 bundles of large, 50 mm. long, light flesh-coloured *male* tubes filled with mobile spermatozoa.

c. Anteriorly to the former, the genital basis supports

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[1] In consequence of the power possessed by the animal of contracting its body, the measurements cannot be exactly given.

25—30 bundles of reddish *female* tubes with large eggs.

d. The foremost part of the genital basis protrudes very minute clusters or simple club-shaped follicles.

Specimen 3. Caught July 9, 1900. Length about 250 mm.

The arrangement of the genital organ in this specimen is much the same as in the preceding, except that the posterior naked portion is longer, and is curved so that it takes the form of an S.

Specimen 4. Caught July 9, 1900. Length about 150 mm.

a. The posterior spiral portion of the genital basis is almost 4 mm. long and is marked with many maculæ, and with several processes with the free end club-shaped and of a yellowish brown colour.

b. The portion in front of the former has 16 bundles of large reddish *female* tubes of an elongated oval form, the largest measuring about 25 mm. in length. The brick-coloured eggs are visible through the thin walls of the tubes.

c. Next in order, we find 23 bundles of light flesh-coloured *male* tubes attaining a length of as much as 15 mm.

d. Most anteriorly are situated the minute clusters and club-shaped tubes.

Specimen 5. Caught July 9, 1900. Length about 200 mm.

The arrangement of the tubes is the same as in specimen 1, except that a bundle situated between the male and female tubes contains, *besides an infinite number of active spermatozoa, large and well developed scattered eggs.*[1]

Specimen 6. Caught July 12, 1900. Length about 150 mm.

a. The posterior spiral portion of the genital basis is beset with a number of distinct maculæ and, in front of these, with eight rather considerable processes having their ends slightly branched and presenting yellowish-brown irregular dilatations.

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[1] I dissected more than 10 other specimens, all captured the same day and in the locality "Flatholmen", and in all these cases the genital bundles were arranged in the same way as in specimen 1. Consequently, among more than 15 specimens, only a single one had the posterior bundles filled with eggs.

b. The portion in front of the former supports a number of *female* bundles with large brick-coloured eggs.
c. The anterior portion carries a number of somewhat smaller *male* bundles.
d. Foremost we find the common clusters and club-shaped bodies.

Specimen 7. Caught July 13, 1900. Length about 175 mm.

a. The posterior portion of the genital basis is of the ordinary shape, and is provided with maculæ and processes, one of which bears four, 4 mm. long branches, filled with eggs.
b. In front of the former there are to be seen 12 large *female* bundles, containing large, nearly ripe, brick-coloured ova.
c. In front of these are situated 15 immature *male* bundles, the posterior ones being, as a rule, the largest, and having a length of 16 mm.
d. Anteriorly to these we have 8—10 small bundles of *female* tubes, about 7 mm. long, with unripe ova.
e. Foremost may be observed the common minute buds or clusters.[1]

Specimen 8. Caught November 1900. Length about 250 mm.

a. The total length of the whole genital basis from the minute, anterior bud-like follicles to the posterior curved end, measures about 6 mm. Its naked portion possesses three sets of marks: posteriorly about 18 rounded, light brown maculæ; an intermediate set of 12 to 14 small knobs of a brownish colour, separated from the former by a narrow naked band, and increasing in size forwards; finally an anterior set of small, 4 to 5 mm. long, bundles of processes.
b. In front of the former are situated about 18 bundles af *male* tubes, the largest measuring only 14 mm. in length.
c. Anteriorly to these, 15 to 20 small bundles of *female* tubes have their place, the largest being only 5 mm.

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[1] Among eight more specimens obtained by dredgings on the same day and from the same locality three had the posterior genital bundles filled with nearly ripe ova, while the remaining five had them filled with ripe spermatozoa. In one instance I counted more than 100 maculæ and prominences on the large posterior spiral portion of the genital basis.

in length; they pass imperceptibly over into the foremost minute clusters and club-like bodies.

Specimen 9. Caught in November 1900. Length about 250 mm. The genital organ of this individual differs from that of the preceding one mainly in these two points: that the posterior end-portion is longer, more curved, and is provided with a greater number of maculæ and protuberances, and that it carries anteriorly about 12 small, 4 mm. long, bundles of tubes evidently of the *male*-sex and in a state of resorption. In front of this part are seen 11 bundles of 13 mm. long *female* tubes filled up with large eggs, and, foremost, a set of small tubes pass imperceptibly over into the well known knobs and club-shaped bodies.

Specimen 10. Caught in November 1900. Length about 250 mm.

a. The genital basis is very large, about 10 mm. long, and curved spirally inwards to a high degree. On account of the curvature of the organ the measures may not be fully correct. The narrow curved end has a brown colour and is evidently in a state of decay. In front appear about 14 brown maculæ, and before them may be observed the same number of knobs with brown tops; finally in front of the knobs are placed about 12 very small, scarcely more than 2,5 mm. long, tubes, each finishing in a tuft of stunted brown branches in a state of absorption.

b. Anteriorly to this portion protrude 13 bundles of *male* tubes having a length of 20 mm.

c. In front of these are observed 16 bundles of somewhat smaller *female* tubes, filled with eggs.

d. The former tubes pass over into smaller ones, and imperceptibly into the foremost minute club-shaped bodies.

From the above extracts taken from my diary it becomes evident that the posterior, naked portion of the genital basis increases in size on approaching age, but it also follows that this increase is confined by the gradual obliteration of its terminal part (cf. specimen 10). Moreover it becomes clear that the maculæ are nothing else than traces of previous genital tubes which have been totally absorbed, and, further, that the minute protuberances placed in front of the maculæ are marks of a somewhat younger generation of such tubes, and lastly, that the small, often bifurcated or, rather, branched processes, situated in front of the former and behind the large genital tubes, represent a still younger set of such tubes in a state of obliteration.

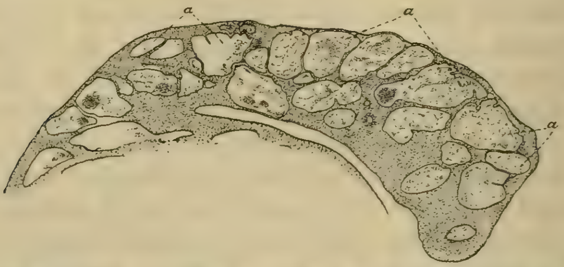
In some instances I counted more than three generations of genital tubes which had already disappeared and, as far as I have been able to prove, these must have alternated with regard to their sexual contents.

Among those genital tubes which are in a state of progressive development, the posterior ones are the largest and oldest, their sexual contents having reached a higher degree of maturity. They decrease anteriorly and pass over imperceptibly into the minute, club-shaped bodies in the front end of the genital basis. Thus, the development of the tubes goes on from before backwards. With regard to the succession in which the different generations of tubes appear, I have not been able to determine whether the first visible generation consists of male tubes or of female.

Without entering into a more detailed analysis of the different tissues which build up the genital basis, I may be allowed to confine myself to the following remarks.

The organ in question is invested by the coelomic membrane made up of rather high cells with an oval nucleus. Scattered among these cells, and between the narrower bases of these, may to be detected other larger, rounded and finely granulated corpuscles. Inside this epithelium, a thin layer of longitudinal and transverse muscular fibres envelopes the remaining main portion of the genital basis, which is formed essentially of connective tissue constituting a more or less spongy stroma of irregular bundles of fibres crossing in all directions. It contains an infinite number of blood-corpuscles or wander cells, proving that the nutritive fluid pervades the tissues in powerful currents, in order to nourish the whole reproductive organ. In addition, the stroma is strengthened here and there by rather coarse threads of a muscular nature. The stroma encloses and bounds a rather wide cavity, having a longitudinal and vertical extention, and clothed with a columnar ciliated epithelium with oval nuclei. The height of the epithelial lining seems to vary in different places, and to reach its maximum on the roof of the cavity.

As the genital cavity stands in open communication with the tubes, the stroma is pierced by combining canals, corresponding in number to that of the tubes themselves. All the canals are lined with ciliated epithelium-cells like those which invest the cavity itself and their walls are even and devoid of folds. It is first towards the periphery, and just on the transition where the canals pass over into the tubes, that a series of longitudinal folds appear. Thus, in a section of the peripheral part of the genital basis, the lumen of the canals presents the aspect of a more or less irregular star. The ciliated investment also ceases where the folds take their origin.

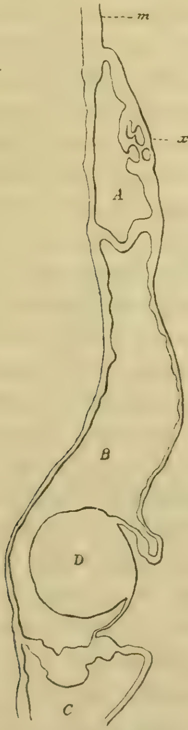


Longitudinal section through the naked posterior portion of the genital basis where the "maculæ" are to be seen. *a* hollow remains from obliterated follicle tubes. Magnified.

From sections through the hinder naked portion of the genital basis, where the maculæ and protuberances have their place, we also discover that close inside them is situated a correspondent hollow, with the confining walls in a state of obliteration or atrophy. In those forms (comp. specimens 9 and 10) where the posterior end of the genital basis is very significant by its size and colour, this work of destruction had advanced so far that that part of the basis encloses only a number of close-lying hollows bounded by thin walls devoid of all epithelial lining, the surrounding tissues having been totally destroyed, or being in state of dissolution. Probably most of the hollows have also lost their communication with the canals.

The efferent duct and the germinal cord.

The efferent duct of the reproductive organ is in the closest connection with the singular ribbon-like formation which I call "germinal cord" and which, in its turn, opens into the genital basis. As far as I have been able to discover, this cord has escaped the attention of previous investigators



Vertical section through the dorsal mesentery in front of the genital basis. *A*, efferent duct of the genital organ; *B*, genital sinus of Semper; *C*, "Nebenschlundsinus" of Semper; *D*, lacunar-blood cord; *m*, dorsal mesentery; *x*, germinal cord with its canals within the left wall of the duct. Highly magnified.

The efferent duct[1] resembles a band compressed at the sides, and runs in a rather straight direction forwards to the neighbourhood of the madreporic canal where it turns upwards in order to accompany the latter and, finally, to open exteriorly on the dorsal surface of the animal. Of course, during its whole course it is attached to the left side of the dorsal mesentery. Posteriorly and below, it is supported by the two mesenteric membranes which limit the genital sinus of Semper.

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[1] Comp. the wood-cut on page 7.

The outer investment of the efferent duct is, of course, a continuity of the coelomic epithelium, its cells being not very high and not distinctly limited but being in possession of an oval nucleus deeply stained with iron-hæmatoxyline. Separated from this layer by a very thin stratum, obviously of muscular nature, a layer of areolar connective tissue forms the main portion of the wall, the filaments crossing each other in larger or smaller bundles in all directions. In the meshes between the bundles can be seen numerous migratory cells of several different appearances, which may be treated of further on in a succeeding chapter.

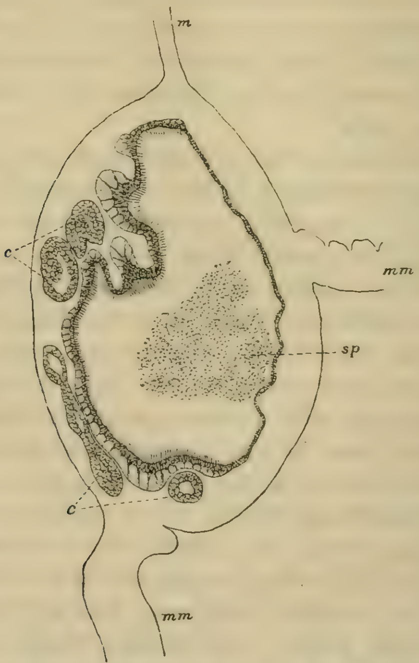
Inside the connective tissue and separated from it by a very thin basement-membrane occurs a ciliated epithelium, presenting a high columnar shape and having the oval nuclei placed close to the broad and superficial end of the cells. Where the duct is in a contracted state, the nuclei are very crowded, so that they present themselves in two layers or more. As a rule, the cells are much higher on the left and upper sides. The peripheral nucleus is surrounded by a layer of finely granulate protoplasm which appears to be unenclosed in a definite cell-wall. Towards the basement-membrane the cells taper into long fine threads which, treated with iron-hæmatoxyline of Haidenhain, become of an almost black colour. The hair-like cilia are long and powerful, especially at the left and upper sides of the duct (Pl. II, fig. 13).

In transverse sections of the efferent duct there appear between the thread-like basal parts of the ciliated cells, large juxtaposed bodies of a fine granular structure (fig. 13 a). Here and there may be perceived a nucleus surrounded by a clear space, but it always has its place close to the basement-membrane and has evidently nothing to do with the bodies in question. Treated with different staining fluids, they still remain pale and almost colourless. At first one is given the impression that the bodies in question represent mucous-secreting cells, but a closer investigation, especially on longitudinal sections, reveals the fact that they are due to considerable bundles of extremely fine filaments running in a longitudinal direction and crossing the interstices between the pointed lower ends of the ciliated cells. In horizontal sections across the columnar cells it is stated with certainty that the "bodies" above mentioned are nothing else than transversely cut bundles of very fine threads. In such preparations stained with iron-hæmatoxyline, the cells present themselves as scattered black points surrounded by the crossing bundles of filaments. As to the nature of the bundles it is of course impossible, for the present, to pronounce any exact idea. However, though it may seem strange, I am inclined to consider them to be peripheral distributions of nerves between the bases of the ciliated epithelium cells.

On the left side of the efferent duct and imbedded in its layer of connective tissue is to be observed a wrinkled and plaited cord-like formation extending from the upper and anterior end of the genital basis, where it communicates with the lumen of the issuing duct, forwards to that part of the duct where it meets the madreporic canal and bends upwards in order to open exteriorly. Just at the curvation, the cord terminates in a small enlargement. It is easily brought into view by treatment with hæmatoxyline, fuchsine, carmine or other solutions. Seen in toto under a low magnifying power, it presents the view of a simple wrinkled band or cord, hence the name germinal cord (comp. the wood-cut on page 7).

In sections across the efferent duct it becomes obvious that its left wall is often somewhat thicker than the right and, besides, is provided with some low ridges or folds protruding into the lumen, one of these being as a rule more prominent. Sometimes I also observed such a low longitudinal elevation on the outer left side. In some very few cases the ridges in question are almost imperceptible, probably owing to a high degree of extension.

Moreover, when examining the sections carefully, it becomes evident that the germinal cord is by no means a solid string, but that, on the contrary, it presents a more or less complicated arrangement, built up either of a single very meandrous canal, or of several limited cylindrical and elongated cavities, always lined with rather large primitive germinal cells which often reduce the central lumen to a minimum (Pl. II, fig. 14). In the same sections I found three to five, sometimes more, cut ends of canals (Pl. I, fig. 6, 7) imbedded in the connective tissue of the left wall of the duct, and in other sections I have observed that some, at least, of these cavities, apparently separate the one from the other, intercommunicate and are twisted in such a manner that a section has passed through the same canal twice, or even several times. Besides, some views make it probable that the canals (or canal) protrude small branches. Nevertheless, from want of sufficient material I am obliged to leave undecided whether the germinal cord is built up of a single highly wrinkled and plaited canal giving off small branches, or if it is composed of a series of shorter wrinkled and branched closed tubes.



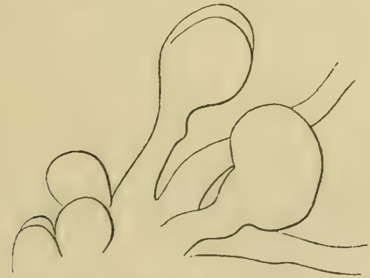
Transverse section of the genital duct. *m*, dorsal mesentery; *mm*, mesenteric membranes confining the genital sinus of Semper; *sp*, amassment of spermatozoa; *c*, canals constituting the germinal cord in the left wall of the duct. Highly magnified.

The germinal canals or tubes are bounded by a thin basement-membrane, inside which are arranged the primary germinal cells with their large rounded nuclei. These cells subsequently become converted into ova and spermatozoa. In the neighbourhood of the genital basis, groups of them protrude, together with surrounding tissues, in order to form minute knobs or club-shaped bodies, the first developmental states of the future genital tubes (Pl. I, fig. 8 f.). Among the true germinal cells, others are to be found characterized by a smaller oval nucleus. These cells do not become converted into ova and spermatozoa, but are follicular cells and probably serve directly in the nutrition of the former.

Consequently, the germinal cord is the matrix from which not only the genital products but even the genital basis and its tubes originate.

The genital tubes.

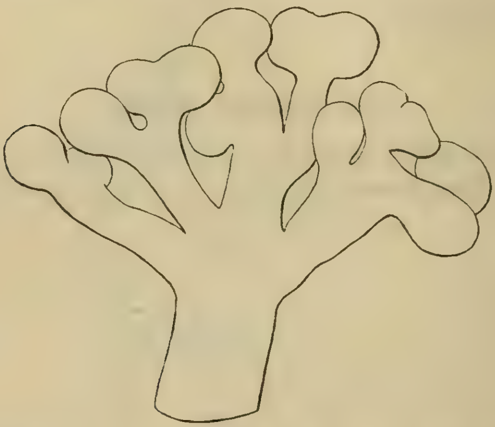
As before mentioned, the tubes shot out from the genital basis, reach their greatest length behind, and shorten gradually forwards, in order to present themselves as very small, simple club-shaped processes at the beginning of the efferent duct. Attention is also called to the singularity that a certain number of genital tubes are male tubes, while another series of tubes contains eggs and that the different generations successively alternate.



The most anteriorly placed small club-shaped bodies representing the earliest developmental stages of genital tubes. Highly magnified.

It has been presumed that the genital tubes remain during the whole life of the Holothurids, and that they retain their faculty of producing eggs and sperma during the whole of that period of time. Mesothuria intestinalis appears to form a remarkable exception from the rule, in-as-much as the emptied bundles of tubes successively become destroyed and obliterated as soon as the animal has spawned. From what I have learned from the extensive literature on the Holothurids, a similar case has not been noticed before.

On the preceding pages I several times used the term "bundle of genital tubes" by which I mean each tuft of tubes running out from a common, more or less elongated, cylindrical stem. With regard to the term "generation of genital tubes" I mean, of course, all such bundles which contain the same sexual products.



A very young follicle bundle, though somewhat older than those in the former wood-cut. Highly magnified.

As before mentioned, the bundle consists of a stem supporting a tuft of dichotomously-branched tubes varying in number in different bundles. In the male bundles the ripe tubes are narrower, cylindrical, and are of a milk-white colour. The female tubes, on the contrary, are elongated fusiform, and of a reddish colour. In one and the same individual, the male and female products very seldom reach maturity at the same period of time.

The number of bundles appears to change considerably. As a rule, they seem to reach their maximum-development during the summer-months and at the beginning of the autumn.

All the specimens caught late in the autumn presented their bundles of genital tubes as comparatively small and unripe.

In order to gain an exact idea of the developmental process of the reproductive bundles, it is most suitable to make a careful examination of the foremost part of the genital basis, just at the place where the minute club-shaped prominences are situated. In their earliest state of development, they present themselves as very insignificant protuberances on the base of the efferent duct and its germinal cord just where these enter the genital basis (comp. the wood-cut on page 19). The protuberances grow larger, and gradually acquire the shape of minute nails with narrow bases and enlarged ends or heads. They take first the form of a mushroom and, finally, they change into clubs with double heads, the first trace of dichotomous branches or tubes. In somewhat older bundles the stem has grown longer and the branches have become doubled but still remain very short, each bundle having the aspect of a bunch of grapes (comp. the wood-cuts on page 20). The further increase is easily understood, and does not need to be given in further detail here.

In 1899, BORDAS[1] published a paper on the reproductive organs in some Holothurids. Thus, he describes in Holothuria impatiens Gmel. a series of minute tubes disposed anteriorly close to the efferent duct. He says: ”Les plus antérieurs sont courts, cylindriques et renflés à leur extrémité libre. Les uns affectent la forme d'un clou, les autres celle d'un champignon et enfin d'autres celle d'une massue. Tout près de ces tubes en existent d'autres de couleur blanchâtre, cylindriques et ramifiés”. He considers these tubes to be quite different in form and structure from the true genital tubes and insists on the point that they are glands ”organes glandulaires” secerning a clear transparent fluid having for function the dilution of the genital products. Nevertheless, on page 6 he writes: ”On pourrait peut-être aussi les considérer comme des tubes génitaux atrophiés” and, moreover, on page 8 he gives them the name ”glandes annexes tubuleuses” and, furthermore, on page 7, he adjoins the following sentence: ”Sur son bord antérieur viennent se fixer les tubes à fonctions problématiques que nous venons de signaler (glandes tubuleuses, canaux génitaux atrophiés ou en voie de développement)". From the above quotations it becomes evident that BORDAS himself was in great doubt as to the true function of these small bodies. In my opinion, there is not the least doubt but that they only represent the youngest and least developed forms of genital tubes, and that they have nothing at all to do with secreting glands in the strictest sense of the word.

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[1] Recherches sur les organes de la génération de quelques Holothuries. — Annales de la Faculté des sciences de Marseille. IX, IV (extract).

With regard to the elementary tissues which compose the genital tubes, I have nothing of importance to add to our present knowledge of them. I only intend to call attention to the most obvious and neglected transformations of the general arrangements to which the tubes are subjected during the ripening process of the sexual products. In very young tubes, both male and female, there is to be found an aggregation of cells of two different kinds: large sexual cells in different stages of karyokinesis, this being especially the case with the male cells, and smaller ones which have as their end to gradually arrange themselves around the eggs in order to form the follicle-membrane and, moreover, to form the internal epithelial lining of the tubes. At this early period, scarcely a lumen is visible, nor are any folds to be detected. Considering that the afflux of nutritious fluid is very sparse at that period, it is very probable that the increasing sexual cells procure their nourishment through the surrounding cells. By degrees, the tubes, invested exteriorly by a ciliated epithelium, grow larger, their lumina become wider and their walls commence to increase in thickness and, simultaneously, to give off a series of longitudinal folds hanging down into the cavity of the tubes. The sexual cells arrange themselves successively in such a manner, that they finally become placed in the glens between the outgrowing folds, which gradually become expanded to such a high degree that they finally conceal the sexual cells and fill up the cavity of the tubes (Pl. I, figs. 9, 10).

The folds in question are sparingly strengthened by connective tissue. Their growth is mainly due to the abundant afflux of blood which causes them to swell, and the increasing germinal cells are certainly in pressing need of the nutritious fluid in their immediate neighbourhood. In sections across a tube, the folds present themselves as transparent and nearly structureless protrusions. Treated with hæmatoxyline, and afterwards stained in a solution of acid-fuchsine, their chief substance seems to be homogeneous and of a light rose-colour. The cellular elements within them are very sparse and ramified, resembling in a certain degree those of connective tissue, but they also present an obvious conformity to wandering plasma-cells intercommunicating by their pseudopodia. In the folds of the female tubes the corpuscles seem to be present more abundantly. In my opinion most of them are true migratory cells, a view supported by the facts that they have around the nuclei, or in their vicinity, a various number of larger and smaller vacuoles, and moreover, they vary greatly in number in different places. Thus, for instance, in many sections of male tubes especially, the cells seem to be totally absent or nearly so.

During the increase of the sexual products, the free border of the folds in question gradually become more and more swollen from the affluent nutritious blood, but, on the contrary, during their ripening process there enters an apparent reduction in volume of the folds, which finally present themselves as very narrow bands, or rather lists, along the inside of the tubes (Pl. I, fig. 11). The number of the folds, commonly four to six, seems to be subject to some variation. Moreover, their arrangement appears to be somewhat different in the two sexes. In the male tubes they are more irregular, and the sexual cells become at a later period of their development not only spread over the glens but also over a great part of the folds themselves.

A full grown but immature ovum measures about 0,5 mm. in diameter. It is surrounded by a thin follicular capsule formed by those cells which subsequently fused, thus forming a membrane in which the nuclei alone remain distinct and become placed on its outer surface. In his beautiful work on the histological structures of the Echinoderms HAMANN[1] says: "Zugleich scheiden diese Zellen eine Membran um die Eizelle ab, welcher sie aussen aufliegen". In my opinion the follicle-cells do not secrete any membrane, but their plasm become fused into a plasmodium, thus constituting a membrane in which the nuclei lie protruding exteriorly as small knobs (Pl. I, fig. 12 f).

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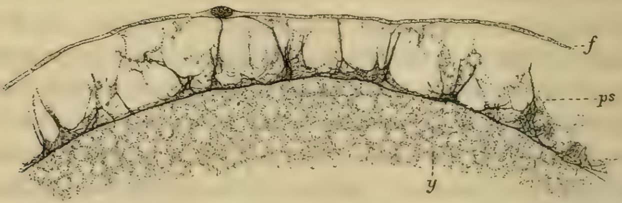
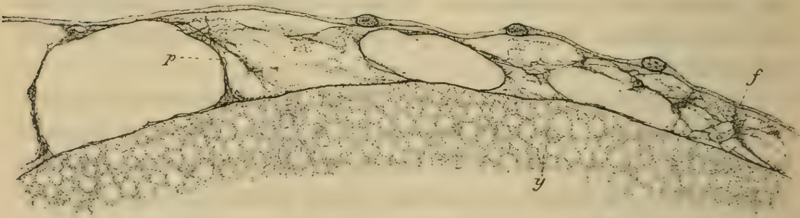
[1] Beiträge zur Histologie der Echinodermen. I. Die Holothurien. Jena 1884.

Hamann,[1] Semper[2] and several other eminent naturalists have stated, that in several Holothurids an albuminous "zona radiata" becomes formed from the ovum. My own experiences show that this is not the case in Mesothuria intestinalis. In vain did I search for a zona radiata, in fresh genital tubes as well as in fixed ones.

However, to judge from preparations stained with iron-hæmatoxyline in conformity to the method of Haidenhain, it is evident that the peripheral layer of the ovum sends out a number of large and irregular pseudopodia-like processes which taper towards their free ends and ramify, certainly in order to be capable of absorbing the greatest possible amount of nutriments from without. They never give rise to a finely radiated appearance resembling a zona radiata.



Part of a section through an egg treated with iron-hæmatoxyline according to Haidenhain. *y*, yolk; *f*, follicular membrane; *ps*, pseudoponia-like processes. Highly magnified.



Part of a section of another egg stained in the same way. *y*, yolk; *f*, follicular membrane; *p*, pellicles. Highly magnified.

When studying somewhat thicker sections, I not seldom observed that, instead of finely branched protrusions, fine pellicles are stretched between the ovum and the follicular capsule, and that they fuse with their bases and upper ends so as to constitute a series of larger and smaller defective hollows arranged inside the capsule. Evidently the pellicles have originated from the processes mentioned, these having become fused and transformed. The truth is, that the processes too, have in general their bases more or less fused together, forming here as well a kind of incomplete membranes. Probably, the processes and plasmatic pellicles in Mesothuria intestinalis are analogous to the albuminous zona radiata of other Holothurids, which, however, here is never visible.

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[1] Beiträge zur Histologie der Echinodermen. I. Die Holothurien. Jena 1884.

[2] Reisen im Archipel der Philippinen. II, 1. Holothurien. Leipzig 1868.

In 1898, IWANZOFF[1] states that the unripe ovum of Holothuria tubulosa sends out processes through the "Gallertschicht" towards the follicular membrane and somewhat earlier, in 1896, ANDREWS[2] appears to have observed the same phenomenon during his studies on "Some spinning activities of protoplasm in Starfish and Sea-Urchin eggs".

In unripe ova, on the part facing the lumen of the genital tube, a layer of homogeneous plasm covers the egg like a calotte (Pl. I, fig. 9, 10), the space being crossed by a number of very fine irregular granulated filaments. However, there are no radiating pore-canals to be detected, nor is any micropyle formed. I suppose this to be the preparation for the protrusion of the micropyle-cone. At a slightly later, stage, the egg sends out through this homogeneous plasma-calotte, besides other processes, an eminent conical protrusion towards the follicular membrane (Pl. I, fig. 12). This becomes the micropyle which always seems to have its direction towards the lumen of the genital tube.

In this earlier developmental stage, the nucleus has taken a decidedly excentral position, and the substance of the ovum has separated into two elementary parts, one coarsely meshed main portion, and another finely granulated part limited to the narrow space between the nucleus and that part of the periphery where the cone protrudes and which corresponds to the space occupied by the clear calotte which now begins to disappear (Pl. I, fig. 12). The micropyle has acquired the shape of a cone with double contures and its top is joined to the follicular membrane. It always contains an irregularly-formed peculiar body, which appears well defined and almost black after being stained with iron-hæmatoxyline. The future fate of this body may be discussed further on.

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[1] Über die physiologische Bedeutung des Processes der Eireifung. Bull. Soc. Natural. Moscou (2) XI, pp. 355 367. I have not had the opportunity of seeing the original paper, but only an extract in "Zool. Jahresbericht für 1898". Berlin 1899.

[2] Journal of Morphology. Vol. XII. Boston 1897.

By degrees, during the progress of the ripening process, the micropyle-cone penetrates the follicular membrane, thus bringing about a communication between the contents of the ovum and the lumen of the genital tubes. According to HAMANN, the conical protrusion of the egg is to be considered as a simple string formed of egg-plasm, finishing in a rounded nucleus-like figure which hangs freely down into the cavity of the genital tubes. However, a careful investigation shows us that it has a rather complicated structure, which may be better understood from the figures given on plate II, 15, 16. In sections treated with iron-hæmatoxyline, the deutoplasm of the ovum presents a thin exterior coat surrounding the interior main-portion, the two constituent parts being well distinguishable one from the other; the inner part has, viz, a much coarser mesh-structure, and at the place of between them there is a dark line of demarcation increasing in clearness towards the micropyle-cone.

The outer deutoplasma-coat also reaches its greatest thickness at the cone where it forms a circular enlargement round its base. Decreasing again in thickness towards the top of the cone, it forms its envelope and confines a string-shaped prolongation of the inner coarsely-meshed deutoplasm which even reaches or possibly penetrates the follicular membrane. Moreover, in vertical sections through the ovum and the micropyle, another structural arrangement is met with. Inside the base or the micropyle-cone, the dark line of demarcation between the two substances emits inwards the coarser deutoplasm an annular valve pierced in the centrum (fig. 15 v.).

As mentioned above, HAMANN found in Holothuria tubulosa that a rounded nucleus-like corpuscle was attached to the top of the micropyle and hung freely down into the cavity of the genital tube. In somewhat more adwanced eggs of Mesothuria intestinalis I regularly observed the same mysterious corpuscle covering the end of the cone like a cap and placed within the lumen of the genital tube. It varies greatly in shape from spherical to more or less curved and elongated. Treated with iron-hæmatoxyline it acquires, the same blackish colour characteristic of the singular body which is mentioned as to be seen within the finely granulated substance of younger ova at the base of the micropyle. When we reflect that the eggs are still in possession of a germinal vesicle with a germinal spot, we see that the corpuscles in question have nothing to do with the extrusion of the polar globules. For my own part I am inclined to consider them as being an excretion from the egg-plasm, and that fig. 12 on my plate I represents an earlier stage, the ovum having not yet thrust it away.

According to my experience the nearly ripe ovum is kept in position within the follicular sack by means of the micropyle-cone being attached to the wall of the sack, which, in its turn, is firmly bound with a broad part of its opposite pole to the inner lining of the genital tube, so as to form a continuous whole with it. In Mesothuria I never observed that the ova are kept in position by any true capsular stalk, such as SEMPER[1] states to be the case in tropic Holothurids, nor have I seen that bundles of fibrilles of connective tissue spin round the ovum in order to keep it fast, as is mentioned by HAMANN.[2]

In sections of the minute genital tubes in their earliest developmental stages, the differences between male and female tubes are well pronounced. The male tubes contain, besides smaller follicular cells with oval nucleus, large geminal cells all of almost the same size and provided with a large rounded nucleus. In female tubes of the same age, on the contrary, the germinal cells vary greatly in size and contain a large vesicula germinativa with a well developed macula germinativa.

In immature genital tubes, the rather large mother-cells of the spermatozoa are at first arranged in the glens between the folds. In the depths of the glens alone do they seem to be more crowded. By degrees, they multiply so as to form several layers distributed over almost the whole inside of the tubes in the glens, as well as on the folds them

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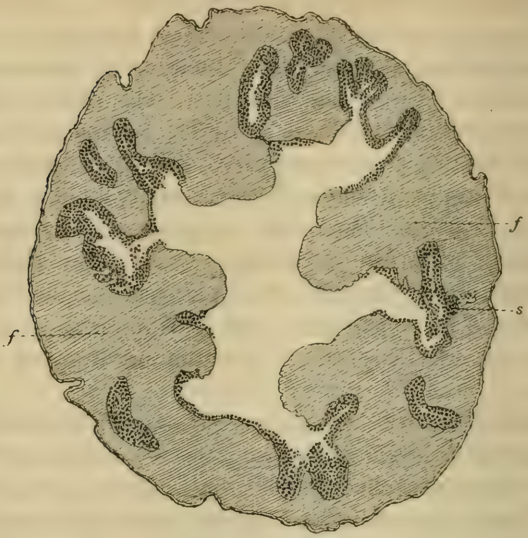
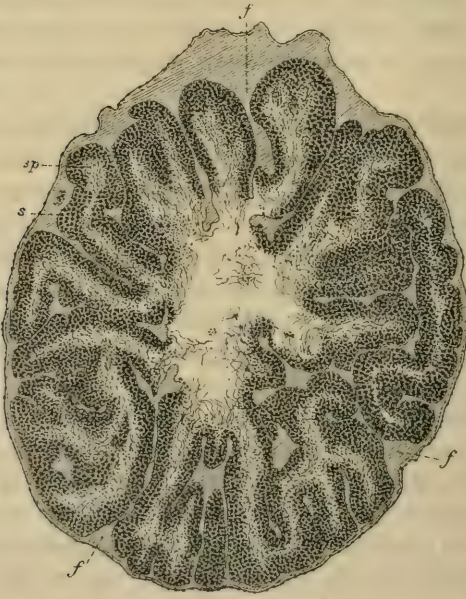
[1] Op. cit.
[2] Op. cit.



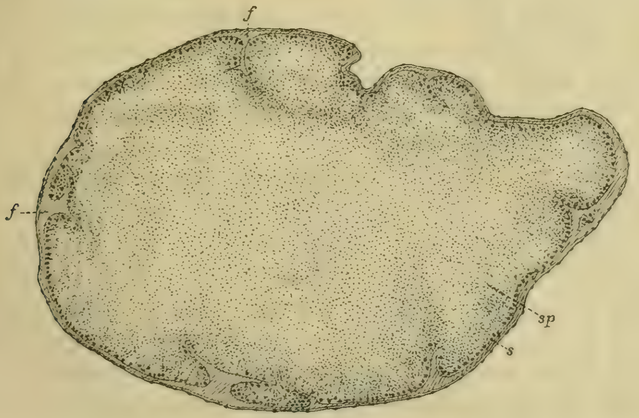
Transverse sections across an immature male tube. *f*, longitudinal folds; *s*, spermoblasts in the glens between the folds. Magnified.



Transverse section of a male tube in a more advanced developmental state. *f*, longitudinal folds; *s*, spermoblasts; *sp*, spermatozoa. Magnified.

selves, which at that period of the maturation have become much narrower and irregular in shape.

After this, all the spermatogenic cells present stages in the division of the nucleus and in different stages of karyokinesis. However, the V-shaped chromatin rods seem to be aggregated at one pole of the nucleus. On the inner side of these germinal cells, a number of much smaller spherical corpuscles are met with, which evidently represent the heads of the spermatozoa. Stained with iron-hæmatoxyline according to Haidenhain, both the heads and the tails become very distinct. I have by no means been able to make clear in what way the spermatozoa are developed from the spermospores but, to judge by all appearances, the nucleus of the spermospore becomes subdivided, the segments of the nucleus giving rise to the main-part of the head. Certainly the spermatozoa do not originate from the spermatogenic cells by direct division. Further investigations may throw light upon this very interesting matter which is so very difficult to elucidate in a perfectly satisfactory manner.



Transverse section of a ripe male tube. *f*, longitudinal folds; *s*, spermablasts: *sp*, spermatozoa. Highly magnified.

In ripe male tubes, the longitudinal folds, which were previously very voluminous, now become almost totally obliterated, and present themselves as almost inconspicuous ridges on the inner wall of the tubes.

The destruction and absorption of eggs and tissues.

It was said before, that, in Mesothuria intestinalis, the posterior portion of the genital basis devoid of genital tubes successively increases in size. This takes place at the cost of the tubes situated immediately in front, which, by degrees, become obliterated. This enlargement, however, is kept within proper limits, because the free curved end of the basis gradually diminishes by absorption and atrophy. Besides, it has been noticed that some genital tubes often present a colour different from that of the others. A careful microscopic inspection reveals that this is due to a process of destruction of the egg-cells within the tubes, causing them to aquire a peculiar colour easily distinguishable in fresh specimens. In both cases, the wandering cells should play a predominant part in the process of destruction.

It lies far beyond the limits of this paper to pay any attention to the great number of papers which treat of the dissolution of tissues and organ-systems (histolys), and where the question has been discussed as to what part the wandering cells (leucocytes, phagocytes etc.) play in these processes as well as in the destruction of minute foreign bodies.[1] Varying views have been propounded, but METSCHNIKOFF's phagocytosis is still sustained by many distinguished investigators.

My own observations support the views of METSCHNIKOFF, the eggs in Mesothuria intestinalis being attacked and ingested solely by amoeboid cells. Concerning the atrophy of the posterior portion of the genital basis, a fatty degeneration may take place, though even here the chief work of destruction is carried out by the phagocytes. It is a fact already well known, that in several forms of Metozoa the eggs and spermatozoa are destroyed by the phagocytes. In 1880, SCHNEIDER[2] pointed out that amoeboid cells are met with within the testes and ovaria of Nephelis, Aulostomum and Hirudo, and that they attack the spermatoblastes and the ova with the result that these finally become absorbed. In addition, he also states that ripe eggs in the Hirudinids are destroyed by a fatty process of degeneration.

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[1] Comp. the works of METSCHNIKOFF, BARFURTH, LOOSS, KOROTNEFF, EBERT, NOETZEL etc.

[2] Über die Auflösung der Eier und Spermatozoen in den Geschlechtsorganen. — Zool. Anzeiger III, 1880, N:o 46. Thanks to PFLÜGER, HIS, LINDGREN, WAGENER etc. we have been made acquainted with the immigration of granulosa-cells within the mammalian ovum, but the respective interpretations of this phenomenon vary.

Considering that there are mainly two kinds of plasma-cells which seem to partake in the resorption-process in Mesothuria intestinalis, it may be suitable to first give an account of them. This description refers only to cells and tissues which have been fixed and hardened in a mixture of formaline and bichromate, or in a sublimate-solution. The staining is regularly performed in iron-hæmatoxyline according to the method of Haidenhain, with or without after-dyeing in acid fuchsine or other aniline-solutions.

1. *Wander-cells with vacuoles* are oval or irregularly rounded large cells with a deeply stained nucleus, and are distinguished by the extreme vacuolation of their clear protoplasm. In preparations treated with iron-hæmatoxyline, the circumference of the larger and smaller vacuoles has acquired an almost black colour, the protoplasm presenting a reticular, somewhat knotted aspect. The plasm separating the vacuoles is clear and finely granulated. It is evident that these plasma-cells exhibit great variations in general appearance, the vacuoles themselves being capable of changing in size and number. In a living state, the cells in question may protrude pseudopodia in all directions. Cells are not seldom met with. in which the reticular aspect has disappeared, whereby the clear protoplasm of the cells seems to enclose a number of dark coloured V-shaped loops. It may be left undecided whether this is due only to an incompleteness in the staining process, or whether we have to do with another kind of plasma-cells. The cells with vacuoles are distributed in all tissues, but particularly in the connective tissue.

2. *Cells with spheres* are the second kind of migratory cells which exhibit a totally different appearance. They are considerably larger than the former and are frequently much elongated, though there are to be found all transitional forms between globular ones and elongated cells. They present themselves under several different aspects this being evidently due to different stages in the development. Thus, for instance, bodies occur containing, besides a spherical nucleus, an abun-

dance of minute globules which become visible after staining in acid fuchsine. The typical cells are characterized by possessing a number of refringent spheres easily brought to view by dyeing in acid fuchsine or iron-hæmatoxyline. The spheres are surrounded by a clear homogeneous protoplasm, vary greatly in number and are also somewhat unequal in size. Thus I counted in smaller cells only a few spheres, while the larger elongated cells contain more than fifty. In properly stained sections it becomes evident that the spheres enclose one, or several smaller globules which have got a deeper colour. Scattered among these cells, other migratory cells are to be seen which have fewer and much larger spheres aggregated so as to resemble a black mulberry. The cells in question are common in all the tissues which constitute the reproductive organ in Mesothuria intestinalis.

Mingled with these two kinds of wander-cells other corpuscles are met with, evidently also capable of movements by means of pseudopodia, and recognised by their rounded form, spherical nucleus, and their homogeneous plasm clear as water. However, they do not seem to play any part in the resorption, and they possibly represent earlier stages of one of the former kinds of cells. Besides it ought to be pointed out, that we have similar cells though with the nucleus now gone and replaced by an irregular, small, blackish body. They are either scattered or aggregated, particularly in such tissues which are in state of resorption. The cells in question have distinct contures, are certainly non-amoeboid and have nothing in common with wander-cells or leucocytes. They very much remind one of fat-cells.

In order to study the absorption of eggs and tissues in Mesothuria, it is necessary to make use of very thin successive sections across such parts of the animal which are in a more or less advanced state of destruction, to treat them with some suitable dyeing solutions, and to examine the preparations under a high magnifying power. Thus, I have taken continuous series of sections through the yellowish brown small protuberances and maculæ placed at the posterior end of the genital basis, and which have been stated to be remains of former genital tubes and, besides, of sections taken through tubes containing eggs in different states of resorption.

In the former I have seen immense masses of oval or elongate plasma-cells with spheres, but never cells with vacuoles (Pl. II, fig. 17). In a single section of such a small protuberance I counted more than one hundred cells with spheres. Considering that a complete series comprises thirty sections or more, we find that more than 3,000 wander-cells with spheres are amassed in this very insignificant prominence. If we pay due attention to the fact that similar plasma-cells are scattered sparingly in the tissues, except in these very places where a degeneration goes on, it becomes evident that a reason must exist why they aggregate just there. Unquestionably they have as their purpose to destroy and devour tissues reduced in vital power. Nevertheless, I do not think that the cells with spheres are the only effective power in this work of destruction, because I have observed in such places clusters of the above mentioned "fat-cells" with a very reduced uneven nucleus. Evidently, here a fatty degeneration also plays an important part in the act of absorbing tissues, though I believe that the wander-cells with spheres execute the essential work.

If we then turn our attention to the process which goes on during the devouring of eggs within the female tubes, we find that the cells with spheres never play any part in their absorption. Here, on the contrary, the cells with vacuoles occur in great abundance (Pl. II, fig. 18, 19). They not only arrange themselves in the circumference of the ovum outside the follicular membrane, but a great number of them have penetrated this membrane and wandered within the deutoplasm in order to devour it. I am sure I do not exaggerate when I estimate the number of such cells which have found their way into certain eggs at more than hundred. Through their agency, the deutoplasm at last becomes entirely removed. On plate II fig. 19 a part of a section of an egg is drawn, showing a number of amoeboid cells with large irregular vacuoles and blackish coloured granules. By chance the section has cut the egg exactly where a migration of cells takes place through the follicular membrane. Wander-cells of quite the same appearance are abundantly met with in the vast lacunar system which is filled with blood-liquid and enclosed within the walls of the genital tubes.

It is a striking fact that not all the eggs in such tubes which are attacked by these migratory cells are destroyed. Some of them at least are evidently capable of resisting the destroying work for a longer time.

Special attention should be paid to the fact that the two kinds of phagocytes perform somewhat different work, the one devouring eggs, the other attacking superfluous tissues and organsystems.

Summary.

1. Mesothuria intestinalis (Ascan.) is a hermaphrodite.
2. This hermaphrodism differs from that known in other Holothurids, the male and female products reaching their maturation in different, successive series of genital tubes.
3. The genital tubes are subjected to a successive destruction and atrophy, from behind in a forward direction.
4. Marks of former genital tubes in the shape of maculæ, protuberances and slightly branched processes are seen on the posterior portion of the genital basis.
5. The genital tubes are supplied anteriorly, a continual growth of new ones taking place from the anterior portion of the genital basis where it communicates with the efferent duct and the "germinal cord."
6. The "germinal cord" is a direct band-like continuation of the genital basis, running along the left side of the efferent duct.
7. The genital basis, with its tubes and their sexual contents, is continually renewed from the germinal cord.
8. The genital basis gradually changes, its posterior end being successively obliterated.
9. The glands of BORDAS are no secernating glands but buds of future genital tubes.
10. During the growth and maturation of the ova and spermatozoa, the longitudinal folds of the genital tubes at first become very voluminous; they gradually decrease, forming finally very inconsiderable ridges. This is due to the afflux and deflux of blood.
11. The eggs may be destroyed by *wander-cells with vacuoles.*
12. The posterior end of the genital basis becomes absorbed by *wander-cells with spheres.*
13. Bundles of very fine (nervous?) filaments cross the rather wide interstices between the bases of the columnar ciliated epithelial cells which invest the cavities of the genital basis and the efferent duct.

Explanation of the plates.

Plate I.

Fig. 1. Anterior portion of Mesothuria intestinalis, the right and left body-walls having been cut away in order to show the reproductive organ »in toto» on the left side of the dorsal mesentery. Magnification $^{4}/_{1}$.

» 2. Generative organ from a small individual. *a*, efferent duct; *b*, lacunar blood-cord; *c*, genital basis; *d*, genital tubes. Magnification $^{8}/_{1}$.

» 3. Genital basis. *a*, efferent duct; *b*, lacunar blood-cord; *c*, the basis carrying the genital tubes; *d*, the tubes cut off; *e*, the porterior naked end of the genital basis with protuberances; *f*, the foremost minute clusterly tubes. Magnification $^{8}/_{1}$.

» 4. Same as above, though from another individual with the posterior end-portion of the genital basis more developed. Signification of the letters as in Fig. 3. Magnification $^{8}/_{1}$.

» 5. Same as above, though from an older specimen. Signification of the letters as in Fig. 3. Magnification $^{8}/_{1}$.

» 6. Transverse section of the left wall of the efferent duct. *a*, the cavities of the germinal cord, stained with Borax-carmine and drown with the Abbé's camera lucida. Highly magnified.

» 7. Similar section of the same duct taken posteriorly to the former. Highly magnified.

» 8. Transverse section through the most anterior part of the genital basis of the same individual. *a*, cavity of the efferent duct; *b*, genital sinus of Semper; *o*, opening between the genital sinus and the perivisceral cavity; *f*, one of the minute club-shaped genital tubes; *x*, the cavity of the germinal cord in open communication with the cavity of the efferent duct; *m*, dorsal mesentery. The cilia are drawn only where they are distinctly stained with carmine. Drawn with the camera lucida under high magnifying power.

» 9. Transverse section of an immature female tube. *e*, eggs; *f*, folds filled with blood-fluid and leucocytes; *fm*, follicle membrane. Treated with iron-hæmatoxyline according to

Haidenhain and drawn with the camera lucida. Highly magnified.[1]

Fig. 10. Longitudinal section of the wall of an immature female tube, *f*, folds filled with blood-fluid and leucocytes. Highly magnified.

» 11. Transverse section of a nearly mature female tube. *e*, egg; *ef*, egg with micropyle; *f*, folds reduced; *fm*, follicle-membrane. Highly magnified.

» 12. Part of a section through an immature egg. *f*, follicle-membrane; *y*, yolk; *vg*, vesicula germinativa; *s*, the micropyle in an earlier developmental state with the "blackish body". Highly magnified.

Plate II.

» 13. Part of a transverse section through the left side of the efferent duct showing the columnar ciliated cells on its inner surface. The cells are here very crowded; their narrow basal-portions, being mostly cut off in the section, appear as irregular crossing dark bands enlarged towards the nuclei and separated by finely granulated masses of light colour; these masses, *a*, are the cut ends of bundles of very fine filaments running in a longitudinal direction. Highly magnified.

» 14. Transverse section of a canal in the germinal cord with primary germinal cells. *a*, a migratory cell with spheres; *l*, lumen of the canal. Highly magnified.

» 15. Section through the micropyle of a nearly ripe egg. *a*, a cylindrical slightly curved body protruding from the egg within the cavity of the genital tube; *b*, follicle-membrane; *c*, outer layer of the egg; *d*, the inner main-portion of the egg with wider meshes; *v*, valve-like formation running out from the dark line of demarcation. Highly magnified.

» 16. Similar view of another egg with a globular body protruding within the cavity; letters the same as in fig. 15.

» 17. Section through a small protuberance in a state of resorption, the remaining part of the genital tube having been destroyed. All the tissues are in a state of absorption by means of migratory plasma-cells with larger and smaller spheres.

» 18. Transverse section of a female genital tube with most of the eggs destroyed and absorbed by migratory cells with vacuoles. In the section one egg, *a*, is unhurt; in the remaining eggs, *e*, the deutoplasm has been almost entirely removed through the agency of the phagocytes.

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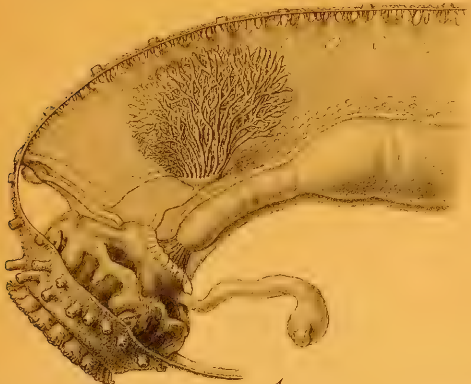
[1] The following figures in the plates I and II are all drawn with the aid of an Abbé's camera lucida and a Winkel, mostly $^{1}/_{24}$ oil immersion, oc. 3. They are all treated with iron-hæmatoxyline in conformity to the method of Haidenhain.

Fig. 19. Part of a section through an egg almost entirely destroyed; *f*, follicular membrane in a state of destruction; *m*, phagocytes immigrated within the ovum; *o*, a wander-cell pearcing the follicle-membrane; *r*, remains of food-yolk. Magnification $^{700}/_{1}$.



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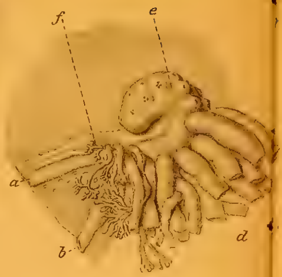

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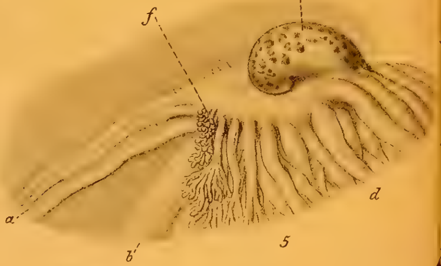

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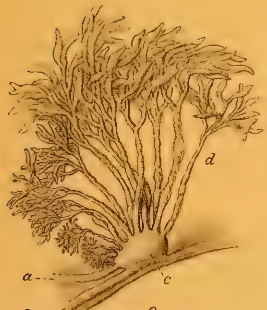

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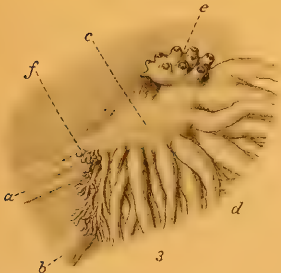

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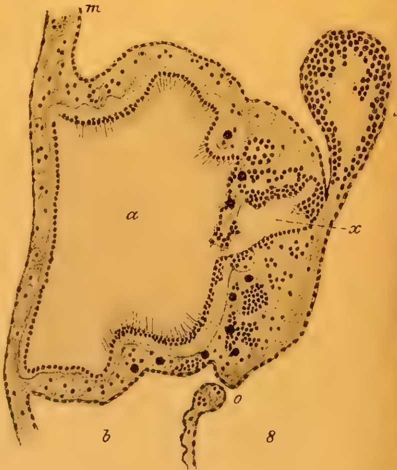

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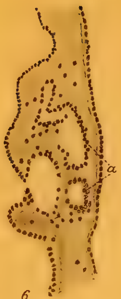

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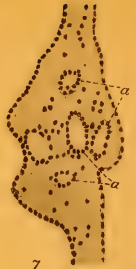

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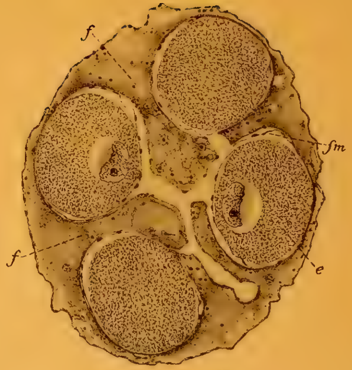

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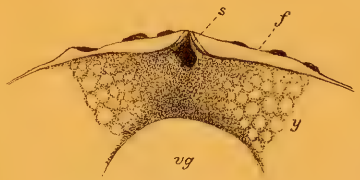

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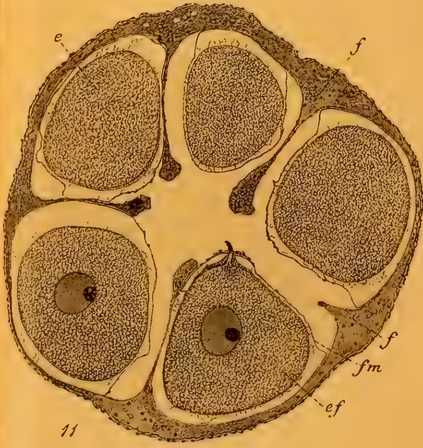

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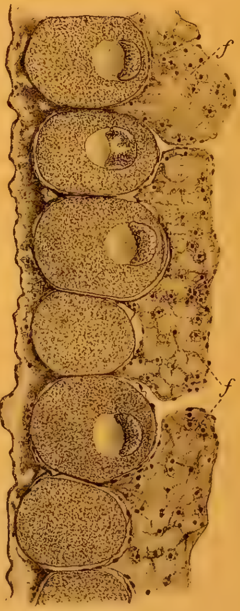

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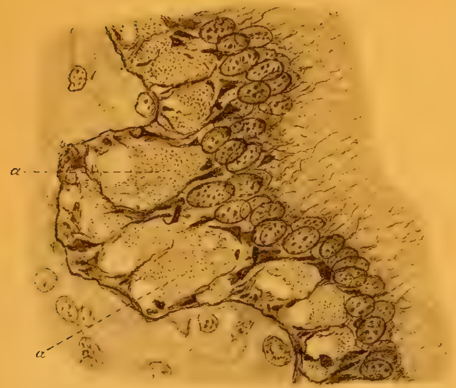
Ljustryck af Chr. Westphal, Stockholm.



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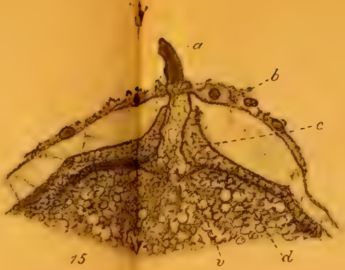

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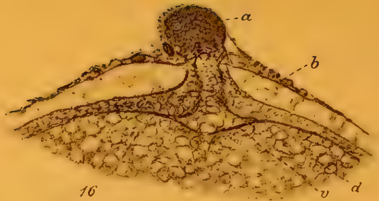

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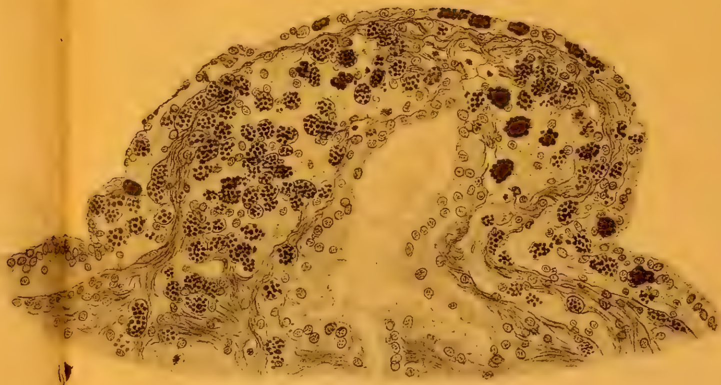

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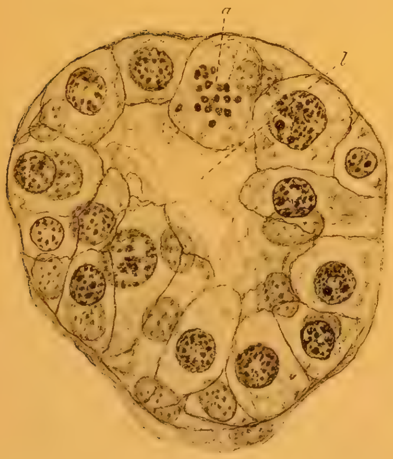

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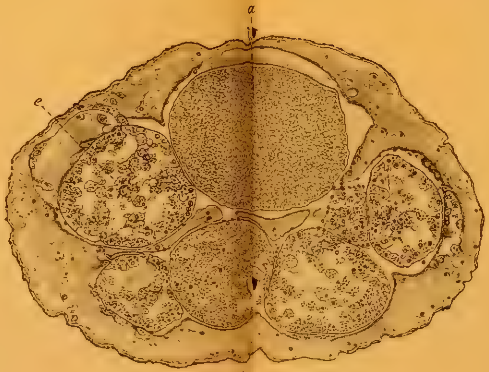

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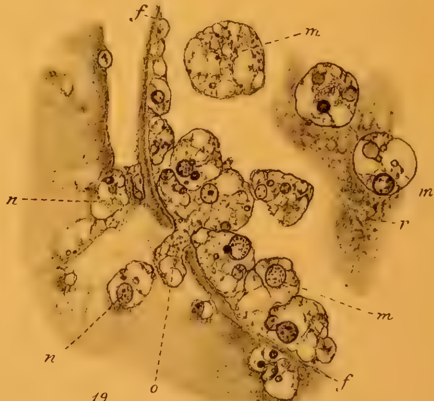

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Ljustryck af Chr. Westphal, Stockholm.

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 7.

ON THE ETHIOPIAN GENERA
OF THE FAMILY
STRIPHNOPTERYGIDAE

BY

CHR. AURIVILLIUS

WITH 5 PLATES

COMMUNICATED TO THE R. SWEDISH ACADEMY OF SCIENCES MAY 8TH 1901

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KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1901

The Striphnopterygidæ are, as far as is hitherto known, restricted to Asia, Africa and Europe. The Asiatic genera have been accurately defined by HAMPSON in the Fauna of British India. Moths. Vol. 1 p. 41—64 and the sole palæarctic genus, *Lemonia*, is discussed by the author in Iris Vol. 7 p. 185. In this paper I propose to give a review of the Ethiopian genera of the family. Without taking the Ethiopian genera into consideration it is impossible to form a correct opinion of the extent and natural definition of the family. I have therefore been compelled to modify the following definition of the family in accordance with the structure of some of the Ethiopian forms.

Fam. **Striphnopterygidæ.**

Proboscis absent or short and weak. Palpi hairy. Antennæ bipectinated in both sexes. Mid tibiæ with one pair of spurs; hind tibiæ usually with two pairs. The abdomen usually shorter, *never longer* than the hind wings. Fore wing with vein 1 forked at the base, 1 c absent, 5 emitted from or from above the middle between vein 4 and 6, *10 absent or very short and emitted from 9 much farther from the cell than vein 8*, 11 free from the cell or rarely anastomosing first with 9 and then with 12. Hind wing with two internal veins, vein 5 from or from above, rarely from below the middle between vein 4 and 6, vein 8 free from the base but usually connected with the cell by an oblique bar. Frenulum and retinaculum usually present in the male, often absent or rudimentary in the female, rarely absent in both sexes.

By the characteristic given above and especially by the singular arangement of the veins 7—10 of the fore wing the family Striphnopterygidæ may easily be distinguished from the families Bombycidæ and Notodontidæ.

HAMPSON[1] distinguishes the Bombycidæ from the »Eupterotidæ» by the absence of the frenulum. The frenulum is however as noted by SNELLEN[2] distinct in the male of *Bombyx mori* and of *Andraca trilochoides* and on the other side there are many genera, undoubtedly belonging to the Striphnopterygidæ, which have the frenulum rudimentary or absent in both sexes. The Bombycidæ have the veins 7—10 of the fore wing arranged in a quite different manner so that vein 10 is emitted nearer to the cell than 8 and 9.

In the Notodontidæ the same conditions take place; vein 10 of the fore wing is always emitted nearer to the cell and longer than vein 9. The genera *Gangarides*, *Thaumetopoea*, *Anaphe* and others agree in this point, as well as in habitus, completely with the Notodontidæ and must therefore as I have already accentuated[3] be referred to the latter family. HAMPSON refers *Gangarides* and *Thaumetopoea* (Cnethocampa) to the »Eupterotidæ» only because they have the proboscis absent. The proboscis is however also absent in the European genus *Ptilophora*, a true Notodontid, and on the other side present in the African genera *Hemijana*, *Camerunia*, *Drepanojana* and *Viana* of the Striphnopterygidæ.

The absence of the proboscis is, I think, of no real use in distinguishing the families of moths.

The Striphnopterygidæ may be divided in two, as it seems, very natural subfamilies.[4]

Key to the Subfamilies.

A. Lower discocellular of hindwing much, usually three times, longer than the middle discocellular.

1. *Striphnopteryginæ.*

B. Lower discocellular of hindwing not or slightly longer, often much shorter, than the middle discocellular.

2. *Janinæ.*

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[1] Fauna of Brit. India. Moths 1. p. 9, 31; Catal. of the Lep. Phalænæ 1, p. 18.

[2] Tijdschr. v. Ent. 43, p. 24, note 1.

[3] Öfvers. Vet. Akad. Förh. 57, p. 1048 (1900).

[4] The African genera *Metadula* WALK., *Metajana* HOLL., »*Sangatissa*» DIST. and *Trotonotus* BUTL. are unknown to me.

Subfamily **Striphnopteryginæ.**

Fore wing with the lower discocellular always much longer than the middle discocellular; vein 10 absent or very short and emitted from vein 9; vein 11 free from the cell. Lower discocellular of hind wing much longer than the middle discocellular, usually very oblique and angled near its upper end.

I consider this subfamily to be the more ancient and more typical group of the family Striphnopterygidæ. To this group belong also the Indo-malayan genera *Pandala*, *Dreata*, *Tagora*, *Pseudojana*, *Ganisa*, *Apha*, *Apona*, *Eupterote*, *Sangatissa* and *Nisaga*, as defined by HAMPSON (Fauna Brit. India 1, p. 41—62), *Sarmalia* WALK. and the palæarctic genus *Lemonia* HÜBN.

Key to the Genera.

I. Vein 6 of fore wing free, not stalked with 7 + 8 + 9 (+ 10), very rarely briefly stalked, but in that case the hind tibiæ with 3—4 spurs.

A. Vein 6 and 7 of hindwing distant or from the same point, not stalked.

α. Lower discocellular of both wings nearly straight; vein 6 of hind wing nearer to vein 7 than to 5.

1. *Striphnopteryx.*

β. Lower discocellular of both wings distinctly angled; vein 6 of hindwing nearer to 5 than to 7 or stalked with vein 5.

* Upper and middle discocellulars of hind wings short, but equally long. Palpi long, reaching far beyond the frons.

2. *Schistissa.*

** Upper discocellulars much longer than middle discocellulars, which are very short or wanting. Palpi short, not reaching beyond the frons.

1. Vein 8 of hind wing united with the cell by an oblique bar; vein 5 and 6 on a long stalk.

3. *Marmaroplegma.*

2. Vein 8 of hind wing free, not connected with the cell by a bar; vein 5 and 6 shortly distant, from the same point or on a very short stalk.

4. *Janomima.*

B. Vein 6 and 7 of hind wing stalked.

α. Hind tibiæ with two spurs only. Vein 11 of fore wing from well before angle of cell. Outer margin of both wings waved.

5. *Lichenopteryx.*

β. Hind tibiæ at least with three long spurs. Vein 11 of fore wing from near angle of cell. Outer margin of both wings entire.

6. *Poloma.*

II. Vein 6 of fore wing stalked with 7 + 8 + 9 (+ 10). Hind tibiæ only with 2 spurs.

A. Fore and mid tibiæ normal and unarmed or only with very small apical spines.

α. The branches of the antennæ not stalked.

7. *Phyllalia.*

β. The branches of the antennæ two and two on a common stalk.

8. *Trichophiala.*

B. Fore tibiæ or the first tarsal joint of the fore legs short and armed with 1 or 2 long and stout spines.

α. Mid tibiæ also short and armed with a long spine. Vein 8 of hind wing remote from 7. Fore tibiæ with one, straight spine.

* Vein 10 of fore wing present but very short.

9. *Phiala.*

** Vein 10 of fore wing absent or rudimentary.

10. *Stibolepis.*

β. Mid tibiæ normal and unarmed. Vein 8 of hindwing approximated to vein 7. First tarsal joint of the fore legs with two, curved spines. Fore tibiæ unarmed. 11. *Sabalia.*

1. **Striphnopteryx** Wallengr.

< *Dreata* Walk. List 4, p. 902 (1855).

= *Striphnopteryx* Wallengr. Öfvers. Sv. Vet. Ak. Förh. 15, p. 209 (1858); typus *B. edulis* Boisd.

Proboscis aborted. Palpi porrect, reaching well beyond the frons; the 3:rd joint distinct, obtuse, as long as broad. Antennæ very long, reaching beyond the apex of the cell of fore wing, broadly bipectinate. Fore tibiæ unarmed, hind tibiæ with 2 spurs only. Wings very broad. Fore wing with vein 3 from well before angle of cell, 5 from below upper angle, 6 free from upper angle, 7 + 8 + 9 stalked from just before upper angle, 10 absent, 11 free from cell near upper angle; the lower discocellular is very long and shortly angled at its upper end, the middle discocellular is straight and erect. Hind wing with vein 5 much nearer to upper angle of cell, 6 and 7 separate, but nearly from the same point, 8 arched at base and nearly touching the middle of cell but not connected with it by a bar; lower discocellular very long, nearly straight, moderately oblique, not angled, middle discocellular straight and rather erect. Frenulum short and weak in the male, retinaculum absent.

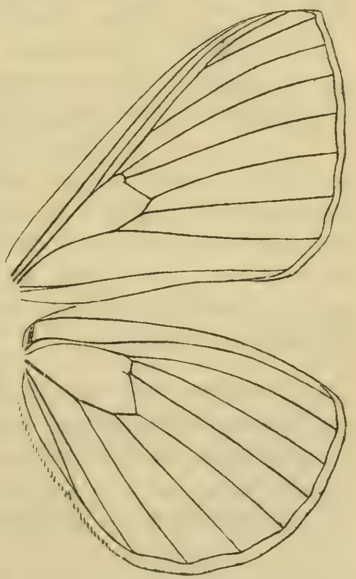

Fig. 1. *Striphnopteryx edulis* ♂.

1. *S. edulis* Boisd. Voy. Deleg. 2, p. 599 (1847). — Walker List 4, p. 903 (1855). — Wallengr. Vet. Akad. Handl. 5: 4, p. 28 (1865).
   Cape Colony. Natal.

2. **Schistissa** n. gen.

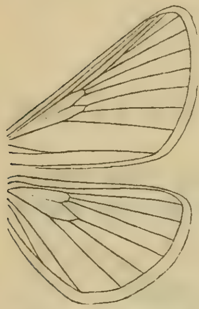

Fig. 2. *Schistissa unifornis* ♂.

Proboscis aborted. Palpi long, porrect, reaching far beyond the frons, very hairy beneath; the third joint conical. Antennæ moderately long, reaching the apex of the cell, very broadly bipectinate. Tibiæ thickly clothed with long hairs on the outer side; fore tibiæ unarmed, hind tibiæ with 2 spurs only. Wings subtriangular, with the costal margin straight and the outer margin convex. Fore wing with vein 3 from near angle of cell, 5 from below upper angle, 6 free from upper angle, 7 + 8 + 9 stalked from upper angle, 10 absent, 11 free from cell near upper angle; the lower discocellular is long and very sharply angled in the middle, the middle discocellular very short and erect. Hind wing with vein 5 much nearer to upper angle of cell, 6 and 7 separate, 8 arched at base and touching the middle of cell but not connected with it by a bar; lower discocellular very long and sharply angled near its upper end, middle discocellular straight and erect. Frenulum and retinaculum absent(?).

1. *S. uniformis* n. sp. — Pl. 5 Fig. 3. — Entirely fuscous brown, unicolorous, wings on upper surface somewhat densely sprinkled with yellowish gray hairs. ♂. — Exp. 64 mm.
   Cape Colony. — In Staudingers collection.

3. **Marmaroplegma** Wallengr.

= *Marmaroplegma* Wallengr. Vet. Akad. Handl. 5: 4, p. 29 (1865).

Proboscis absent. Palpi very short, hairy, dependent. Antennæ broadly bipectinate in the male, shortly in the female. Fore tibiæ normal and unarmed, hind tibiæ with two small spurs only. Wings rather narrow. Fore wing with vein 3 from well before angle of cell, 5 and 6 from the same point, 7 + 8 + 9 stalked, 10 absent, 11 free from the cell well before upper angle; the lower discocellular long and sharply angled near its middle, the middle discocellular absent, the upper discocellular long, straight and very oblique. Hind wing with vein 3 from before angle of cell, 5 and 6 on a long stalk from near upper angle of cell, 7 free from upper angle, 8 arched at base and connected with the middle of cell by an oblique bar; lower discocellular long and angled near its upper end, middle discocellular absent, upper discocellular rather short and straight. Frenulum and retinaculum absent in both sexes.

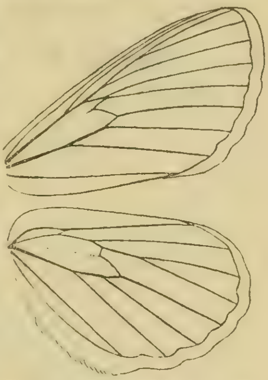

Fig. 3. *Marmaroplegma paragarda* Wallengr. ♂.

*1. *M. paragarda* Wallengr. Wien E. Mon. 4, p. 166 (1860); *paragauda* Wallengr. Sv. Vet. Akad. Handl. 5: 4, p. 29 (1865). »Caffraria». Natal.

4. **Janomima** n. gen.

Proboscis aborted. Palpi porrect, short, not reaching beyond the frons, thickly clothed with hair beneath; the third joint minute, indistinct. Antennæ bipectinate, rather short, not reaching the apex of the cell of fore wing. Fore tibiæ unarmed, hind tibiæ with apical spurs only; claws simple. Wings very broad and thickly clothed with scales. Forewing with vein 3 from well before angle of cell, 5 and 6 from upper angle of cell, 7 + 8 + 9 stalked from well before upper angle of cell, 10 absent, 11 free from middle of cell; lower discocellular long, more or less angled and very slender in its upper part; upper discocellular long and very oblique. Hind wing with vein 5 nearly from the same point as 6 or at least 6 remote from 7, 8 arched from base, remote from the cell and not connected with it by a bar; lower discocellular very long and oblique, angled near its upper end. Frenulum and retinaculum well developed in the male, weak in the female.

The species of this well defined genus are either very variable or more numerous than hitherto supposed.

*1. *J. mariana* White An. N. H. (1) 12, p. 264 (1843). — Walk. List 4, p. 911 (1855).
Congo. German E. Africa.

2. *J. Danfelti* Aur. Ent. Tidskr. 14, p. 208 (1893).
Congo.

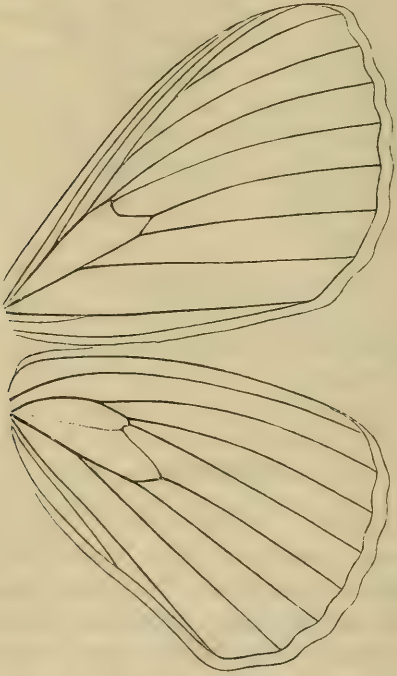

Fig. 4. *Janomima mariana* ♂.

°3. *J. Westwoodi* n. sp.
mariana Westw. Oates Matabele Land p. 358 t. G. f. 6, t. H. f. 4, 4a, 4b (1882); Ed. 2 p. 367 t. 7 f. 6, t. 9 f. 4, 4a, 4b (1889).
Brit. South Africa: Tati Fluss.

5. **Lichenopteryx** Feld.

= *Lichenopteryx* Feld. Reise Novar. Lep. Het. p. 6 (1868).

Proboscis aborted. Palpi porrect, minute, not reaching beyond the frons, hairy beneath; the third joint indistinct.

Antennæ nearly reaching the apex of the cell in male, shorter in female, with the pectinations moderately long in male, short in female. Fore tibiæ of normal length with a very short spine at apex, mid tibiæ unarmed, mid and hind tibiæ with 2 apical spurs only. Wings broad with the outer margin distinctly waved. Fore wing with vein 3 from well before angle of cell, 5 from near upper angle, 6 free from upper angle, 7 + 8 + 9 + 10 stalked, 11 free from well before upper angle of cell; lower discocellular long and sharply angled in the middle; middle discocellular short and erect. Hind wing with vein 5 from near upper angle of cell, 6 and 7 stalked, 8 arched at base and connected with the cell before middle by an oblique bar; lower discocellular long oblique and distinctly angled nearer its upper end. Frenulum and retinaculum well developed in male, very weak and nearly rudimentary in female. Apex of the abdomen bent down in female.

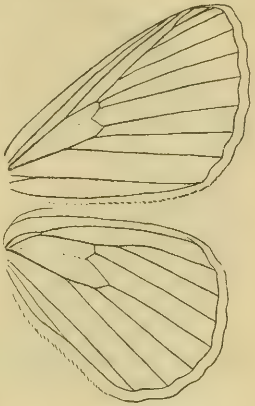

Fig. 5. *Lichenopteryx despecta* ♂.

This genus is distinctly allied to *Phiala*.

*1. *L. despecta* Felder Reise Novara Lep. t. 95 f. 5 (1868). — Pl. 5 Fig. 1 ♀.
Natal.

°2. *L.? conspersa* Kirby An. N. H. (6) 18 p. 389 (1896).
Brit. East Afrika: Kisakon River.
May, to judge from the description, be a species of *Chrysopoloma*, a genus belonging to a quite different family.

6. **Poloma** Walk.

= *Poloma* Walker List 4 p. 858 (1855); type *angulata* Walk.

Proboscis aborted. Palpi porrect, very densely hairy, closely pressed to the frons, not or briefly reaching beyond the frons. Antennæ moderately long, bipectinate. Tibiæ normal, unarmed, densely hairy; mid tibiæ with 2, hind tibiæ with 3—4 spurs. Wings moderately broad, densely squamose. Fore wing with vein 3 near angle of cell, 5 from well below upper angle, 6 from upper angle or very shortly stalked with 7 + 8 + 9, 10 absent, 11 free from cell near upper angle; lower discocellular nearly straight and very slender in its upper part; middle discocellular rather long, straight and erect; veinlet in cell distinct and deeply forked. Hind wing with vein 5 near to upper angle of cell, 6 and 7 stalked, 8 near base connected with the cell by a bar; lower discocellular oblique, nearly straight, obtusely angled near its upper end. Frenulum and retinaculum well developed in the male, absent in the female.

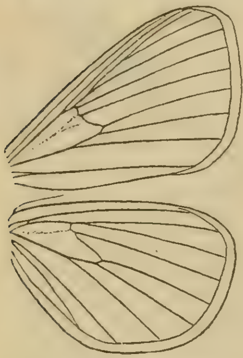

Fig. 6. *Poloma angulata* ♂.

Poloma differs from the nearly allied genus *Phyllalia* by the almost straight lower discocellular of forewing and by having 3 or 4 spurs to the hind tibiæ.

*1. *P. angulata* Walker List 4 p. 858 (1855),
janula Felder Novara Lep. t. 94 f. 4 (1868).
Natal.

2. *P. nigromaculata* Aurivillius Ent. Tidsskr. 14 p. 210 (1893). — Pl. 2 Fig 2 ♂.
Natal.

3. *P. castanea* n. sp. — Tota castanea, capite, thorace et abdomine supra obscurioribus, fusco brunneis aut nigrobrunneis; alis anticis ad marginem costalem et exteriorem infuscatis et pone medium lineis duabus transversis fuscis, exteriore duplici, ornatis. infra castaneis lineis transversis obsoletis; posticis utrinque castaneis, supra unicoloribus, pilis brunneo-fuscis ad marginem internum dense vestitis, infra lineis duabus transversis fuscis; ciliis omnibus brunneo-fuscis. — Expans. alar. 57 mm.
Natal. — Museum Holmiæ.

The fore wings are somewhat longer and narrower than in *P. angulata*. At the base of the antennæ there are some whitish hairs.

7. Phyllalia.

= *Phyllalia* WALKER List 6 p. 1494 (1855); type *Ph. concolor.*

= *Homochroa* WALLENGR. Öfvers. Vet. Akad. Förhl. 15 p. 142 (1858); Vet. Akad. Handl. 5: 4 p. 29 (1865); type *patens.* — nom. præocc.

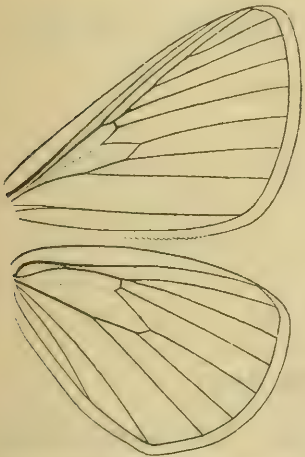

Fig. 7. *Phyllalia patens* ♂.

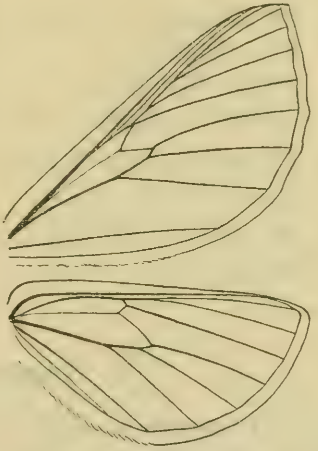

Fig. 8. *Phyllalia patens* ♀.

Proboscis aborted. Palpi porrect, densely clothed beneath with hairs, not or hardly reaching beyond the frons; third joint longer and more distinct in the female. Antennæ not reaching the apex of the cell, bipectinate, the pectinations long in male, very short in female. Tibiæ of normal length; fore tibiæ with two small spines at the apex; hind tibiæ only with 2 spurs. Wings broad and thickly scaled in male, but longer, narrower and thinly scaled in female. Fore wing with vein 3 from well before angle of cell, 5 from below upper angle, 6 stalked with 7 + 8 + 9, 10 absent, 11 free from cell near its upper angle; lower discocellular long and sharply angled in the middle, middle discocellular short and nearly erect. Hind wing with vein 5 near to upper angle of cell, 6 and 7 stalked, 8 arched at base and nearly touching the middle of cell in the male, almost straight and very approximated to the cell and to vein 7 in the female; lower discocellular long and oblique, distinctly angled near its upper end; middle discocellular short and straight, nearly erect. Frenulum and retinaculum absent in both sexes.

*1. *Ph. patens* Boisd. Voy. Deleg. 2 p. 599 (1847). — Wallengr. Vet. Ak. Handl. 5: 4 p. 29 (1865).
♂ *concolor* (*Dreata*) Walk. List 4 p. 908 (1855).
♀ *concolor* (*Phyllalia*) Walk. List 6 p. 1495 (1855).
Natal.

2. *Ph. Thunbergi* Boisd. Voy. Deleg. 2 p. 599 (1847). — Pl. 2 Fig. 1 ♂.
incerta Walk. List 4 p. 905 (1855).
Caffraria. Natal. Zululand.

3. *Ph. valida* Felder Novara Lep. t. 93 f. 6 (1868).
Cape Colony.

°4. *Ph. degenera* Walk. List 4 p. 906 (1855).
South Africa.

8. **Trichophiala** Auriv.

= *Trichophiala* Auriv. Öfvers. Vet. Akad. Förhandl. 36: 7 p. 53 (1879).

Proboscis aborted. Palpi short, hairy and porrect or dependant. Antennæ of female not reaching the apex of the cell of fore wing, their pectinations short and *stalked*. Fore tibiæ normal, unarmed; hind tibiæ with 2 spurs only. Wings moderately broad, somewhat thinly clothed with scales and hairs. Fore wing with vein 3 from well before angle of cell, 5 from very near upper angle of cell, 6 stalked with 7 + 8 + 9 + 10, 11 free from near middle of the cell; lower discocellular long and sharply angled in the middle. Hind wing with vein 5 very near to upper angle of cell, 6 and 7 stalked, 8 connected with the cell near base, by a bar; lower discocellular very long, oblique and sharply angled near its upper end. Frenulum of the female absent. — Male unknown.

*1. *T. Devylderi* Auriv. Öfvers. Vet. Akad. Förhandl. 36: 7 p. 54 (1879). — Pl. 3 Fig. 4 ♀.
Damara Land.

9. **Phiala** Wallengr.

< *Rhabdosia* Hübn. Verz. p. 192 (1827) type *tharops* Stoll.[1]
< *Olistheria* Hübn. Verz. p. 193 (1827) type? *zatima* Stoll.
= *Heteromorpha* Herr. Sch. Aussereur. Schm. p. 11 f. 375 (1855); type *costipuncta*. — nom. nudum et præoccup.
= *Phiala* Wallengr. Wien. Ent. Mon. 4 p. 165 (1860); Vet. Akad. Handl. 5: 4 p. 33 (1865); type *costipuncta* H. Sch.

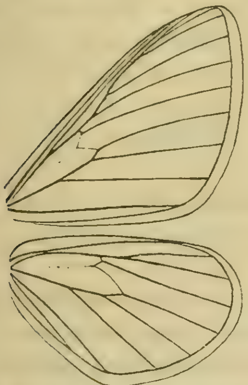

Fig. 9. *Trichophiala Devylderi* ♀.

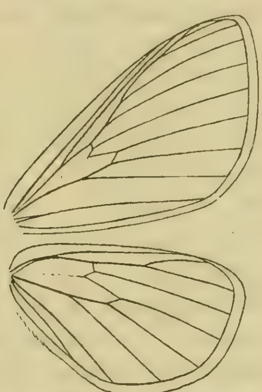

Fig. 10. *Phiala costipuncta* ♀.

Proboscis aborted. Palpi short, porrect, hairy, not reaching beyond the frons. Antennæ of normal length, bipectinate; the pectinations long and slender in the male, very short in the female. Fore tibiæ short, armed at apex with one long and acute, straight spine; mid tibiæ also very short and armed at tip with one long and acute spine; hind tibiæ with 2 spurs only. Wings moderately broad, rather densely scaled. Fore wing with vein 3 from well before angle of cell, 5 from near upper angle, 6 stalked with 7 + 8 + 9 + 10, 11 free from cell well before upper angle; lower discocellular long and very oblique, sharply angled nearer its upper end; middle discocellular very short and erect. Hind wing with vein 5 much nearer upper angle of cell, 6 and 7 stalked, 8 free and arched at base but anastomosing shortly with the cell before its middle; lower discocellular very oblique, strongly angled near its upper end, middle discocellular short and nearly erect. Frenulum distinct in male, rudimentary in female.

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[1] The description of the genus *Rhabdosia* Hübn. runs as follows: »Both wings nearly transparent, coloured at the veins and shaded at the outer margin». This description agrees only with *tharops* Stoll but altogether not with *vaninia* Stoll. *Tharops*, therefore, must be taken as the type of *Rhabdosia*.

The palæarctic genus *Lemonia* seems to me undoubtedly very nearly allied to *Phiala* and *Phyllalia.*

*1. *Ph. costipuncta* Herr. Sch. Aussereur. Schm. f. 375 (1855);
atomaria Walk. List. 4 p. 866 (1855);
xanthosoma Wallengr. Wien. Ent. Mon. 4 p. 165 (1860). Vet. Akad. Handl. 5: 4 p. 34 (1865). — Snellen Tijdschr. v. Ent. (2) 7 p. 47 t. 4 f. 4—6 (1872); (2) 8 p. 124 (1873);
punctilinea Walk. Trans. Ent. Soc. Lond. (3) 1 p. 264 (1862).
Cape Colony. Damara Land. Angola. Congo.

2. *Ph. venusta* Walk. List. 32 p. 360 (1865).
Sierra Leona.

3. *Ph. dasypoda* Wallengr. Wien Ent. Mon. 4 p. 165 (1860); Vet. Akad. Handl. 5: 4 p. 34 (1865).
»Caffraria».

4. *Ph. bistrigata* n. sp. — Alba, fronte, antennis, palpis, pedibus, abdomineque ochraceis, tarsis nigromaculatis; alis supra niveis, infra flavicantibus, supra squamis atris conspersis et strigis duabus transversis atris, una pone medium, altera prope marginem ornatis. — Expans. alar. exp. 40 mm.
Cape Colony. Staudingers collection.

5. *Ph. arrecta* Dist. An. N. H. (7) 4 p. 361 (1899).
Transvaal.

*6. *Ph. incana* Dist. An. N. H. (6) 20 p. 205 (1897).
Transvaal.

*7. *Ph. flavipennis* Wallengr Öfvers. Vet. Akad. Förhandl. 31: 1 p. 98 (1876).
Transvaal.

*8. *Ph. polita* Dist. An. N. H. (6) 20 p. 205 (1897).
Transvaal.

9. *Ph. vaninia* Stoll Pap. Exot. 4, t. 356, f. G. (1781).
Cape.

10. **Stibolepis** Butl.

= *Stibolepis* Butl. An. N. H. (5) 2 p. 463 (1878); type *fervidaria* Fabr.

Proboscis aborted. Palpi porrect, not reaching beyond the frons; third joint small, conical. Antennæ moderately long, bipectinate; the pectinations long in the male, very short and connected at the base in the female. Fore and mid tibiæ short and armed at the tip with one long and acute spine; mid and hind tibiæ each with 2 long spurs. Wings broad. Fore wing with vein 3 from well before angle of cell, 5 from below upper angle, 6 stalked with 7 + 8 + 9, 10 absent, 11 free from near middle of cell; the lower discocellular long, oblique and sharply angled near its upper end; middle discocellular straight and erect. Hind wing with vein 5 much nearer to upper angle of cell, 6 and 7 stalked, 8 arched and near base connected with the cell by a bar; the lower discocellular long, oblique and sharply angled at its upper end; middle discocellular straight and oblique. Frenulum well developed in the male, absent in the female.

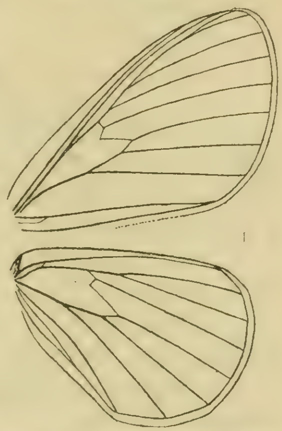

Fig. 11. *Stibolepis fervidaria* ♀.

This genus is very nearly allied to *Phiala* and differs hardly but by the more ample wings, by vein 10 of fore wing being absent (in *S. alba* there is a rudiment of it) and by vein 8 of hind wing not anastomosing with the cell.

1. *S. cunina* STOLL Pap. Exot. 3 p. 114 t. 257 f. G. (1779).
Sierra Leone.

*2. *S. fervidaria* FABR. Mant. Ins. 2 p. 187 (1787);? = N:o 1;
nivea BUTL. An. N. H. (5) 2 p. 463 (1878).
Sierra Leone. — Camerun.

3. *S. albida* PLÖTZ Stett. E. Zeit. 41 p. 87 (1880);
sylvia DRUCE Proc. Zool. Soc. 1886 p. 410 (1886).
Camerun.

°4. *S. abluta* HOLL. Ent. News 4 p. 343 t. 15 f. 14 (1893).
West-Africa: Kangwe.

5. *S. alba* AURIV. Ent. Tidskr. 14 p. 210 (1893).
German East Africa.

°6. *S. atomaria* HOLL. Entomolog. 25 Suppl. p. 93 (1892);
Proc. U. S. N. Mus. 18 p. 251 (1895).
Brit. East Africa: Taveta.

°7. *S. odites* SCHAUS Coll. S. Leone Lep. p. 30 t. 1 f. 9 (1893). Sierra Leone.

°8. *S. subiridescens* HOLL. Psyche 6 p. 490 t. 18 f. 11 (1893). Ogove River.

11. **Sabalia** WALK.

= *Sabalia* WALK. List 32 p. 547 (1865). — AURIV. Ent. Tidskr. 14 p. 206 (1893). — KARSCH Ent. Nachr. 21 p. 343 (1895); 24 p. 290 (1898). — HAMPS. Tr. Ent. Soc. Lond. 1901 p. 189 figg. (1901); type *picarina*.

= *Heteranaphe* E. SHARPE An. N. H. (6) 5 p. 442 (1890); type *Jacksoni*.

= *Hyperanaphe* (sic!) KIRBY Syn. Cat. Het. 1 p. 577 (1892); type *Jacksoni*.

= *Conventia* WEYMER Berl. E. Zeit. 41 p. 88 (1896); type *sericaria* WEYM.

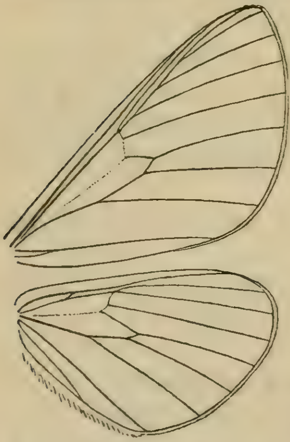

Fig. 12. *Sabalia picarina* ♀.

Proboscis aborted. Palpi slight, porrect, setose, not reaching beyond the frons; third joint long, nearly cylindrical. Antennæ rather long, but not reaching the apex of the cell of fore-wing, in both sexes moderately bipectinate. Fore tibiæ short; first joint of fore tarsi armed with two curved spines, of which the apical is much longer; mid and hind tibiæ with apical spurs only. Fore wing with vein 3 from well before angle of cell, 5 from below upper angle, 6 stalked with 7 + 8 + 9, 10 absent, 11 free from near upper angle of cell; lower discocellular long and angled in the middle, middle discocellular short and erect. Hind wing with vein 5 much nearer to upper angle of cell, 6 and 7 on a very short stalk or from the same point, 8 arched at base, connected with the cell by an oblique bar and nearly approximated to the origin of vein 7; lower discocellular very long, oblique and sharply angled near its upper end; middle discocellular rather long, slightly curved and nearly erect. Frenulum absent in both sexes.

The systematic position and affinities of this genus have been the subject of some discussion.[1] Every one, who compares the neuration of *Sabalia*, *Phyllalia*, *Phiala* and other genera of Striphnopteryginæ, must however, I think, admit that *Sabalia* is connected with the more typical genera of the subfamily by intermediate forms, which completely fill up the gap between *Sabalia* and *Striphnopteryx*. The genus *Brahmæa*, the only known representant of *Hampsons* family Brahmæidæ, is also very nearly allied to the Striphnopteryginæ and especially to *Sabalia*. The short and week but distinct proboscis, the short and singularly formed cell of hind wing together with the very peculiar style of coloration and the structure of the larva prevent me however at present from uniting *Brahmæa* with the Striphnopterygidæ. HAMPSON[2] states also that the frenulum is absent, but at least in the male of the African *B. lucina* there is a distinct frenulum and retinaculum.

*1. *S. picarina* WALK. List 32 p. 548 (1865). — KARSCH Ent. Nachr. 24 p. 289 fig., p. 292 (1898). — HAMPS. Tr. E. Soc. Lond. 1901 p. 190 fig. (1901).
Zambezi — German East-Africa.

2. *S. Jacksoni* EM. SHARPE. An. N. H. (6) 5 p. 443 fig. (1890). — KARSCH Ent. Nachr. 24 p. 292 (1898).
Germ. East Africa. — Brit. East Africa.

3. *S. Fülleborni* KARSCH Ent. Nachr. 26 p. 354 (1900).
Nyasaland.

*4. *S. Tippelskirchi* KARSCH Ent. Nachr. 24 p. 292, 293 (1898).
Germ. East Africa: Iramba.

5. *S. fulvicincta* HAMPS. Tr. E. Soc. Lond. 1901 p. 190 (1901).
Nyasaland.

*6. *S. sericaria* WEYMER Berl. E. Zeit. 41 p. 89 (1896). — KARSCH Ent. Nachr. 24 p. 292, 294 (1898).
Germ. East Africa: Victoria Nyanza.

Subfamily **Janinæ.**

Forewing with the lower discocellular usually not longer than the middle discocellular; vein 10 absent; vein 11 free or stalked with 6—9. Lower discocellular of hind wing not or very slightly longer, often much shorter than the middle discocellular, always straight, not angled; middle discocellular long, oblique and usually angled near its upper end.

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[1] Cf. KARSCH, Ent. Nachr. 21 p. 343; 24 p. 291; HAMPS. Tr. E. Soc. Lond. 1901 p. 187.

[2] Fauna of Brit. India. Moths. 1 p. 29; Cat. Lep. Phalæn. 1 p. 18.

In this subfamily the vein 5 of both wings arises farther from the upper angle of cell, nearly in the middle between vein 4 and 6 or even a little nearer to vein 4 than to vein 6. Hereby some of the genera come near to the singular ethiopian genus *Hibrildes* DRUCE (= *Anengya* KARSCH), the systematic position of which is still uncertain.

The asiatic genera *Melanothrix* and *Palirisa* must be referred to the Janinæ.

Key to the Genera.

I. Lower discocellular of fore wing nearly twice as long as the middle discocellular and angled near its upper end.

12. *Hemijana*.

II. Lower discocellular of fore wing not or slightly longer than the middle discocellular, usually straight.

A. Veins 6 and 7 of hind wing not stalked. Vein 11 of fore wing free from the cell

α. Vein 8 of fore wing to the apex. Middle discocellular nearly erect and not or hardly longer than the lower discocellular.

* Fore tibiæ normal, unarmed.

13. *Jana*.

** Fore tibiæ short, armed at tip with one or two stout spines.

14. *Hoplojana*.

β. Vein 8 of fore wing to the outer margin well below the apex. Middle discocellular very oblique and much longer than the lower discocellular.

15. *Acrojana*.

B. Veins 6 and 7 of hind wing on a long stalk.

α. Vein 11 of fore wing entirely free and arising from the cell close before its apex. Vein 8 runs to the apex of forewing.

16. *Camerunia*.

β. Vein 11 of forewing anastomosing with vein 9 to near its middle and then forming a very short bar between vein 9 and 12 or very rarely free at its origin and thereafter anastomosing with 9 forming a very narrow, linear areole (fig. 20). Vein 8 of forewing runs to the outer margin well below apex and vein 9 to the apex.

* Veins 6—8 of fore wing given off one after the other from vein 9.

17. *Epijana.*

** Veins 7 and 8 of fore wing on a common stalk from vein 9 + 11.

1. Vein 6 of fore wing given off from the common stalk of 9 + 11 + (7 + 8).

a. Anal angle of hind wing broadly rounded, indistinct. Fore wing not or slightly falcate.

18. *Phasicnecus.*

b. Anal angle of hind wing produced, very distinct. Fore wing falcate.

19. *Drepanojana.*

2. Vein 6 of fore wing given off from the common stalk of 7 + 8.

20. *Viana.*

12. **Hemijana** n. gen.

Proboscis short, but distinct. Palpi porrect, densely hairy beneath, not reaching beyond the frons. Antennæ reaching the apex of the cell of fore wing, bipectinate; the pectinations in the male rather long at the base, gradually shorter towards the apex. Fore tibiæ unarmed, hind tibiæ with 4 long spurs. Wings moderately broad, densely scaled. Fore wing with vein 3 from well before angle of cell, 5 from nearer the upper angle, 6 free from upper angle, 7 + 8 + 9 stalked from the upper angle, 10 absent, 11 free from cell near upper angle, vein 9 to the apex; the lower discocellular is long and oblique, distinctly angled at is upper end; the middle discocellular is straight and erect, only half as long as the lower. Hind wing with vein 5 nearer to lower angle of cell, 6 and 7 stalked, 8 nearly straight and connected with the cell by a short bar; lower discocellular straight and oblique much shorter than the middle discocellular, which is also oblique an angled at its upper end. Frenulum and retinaculum absent.

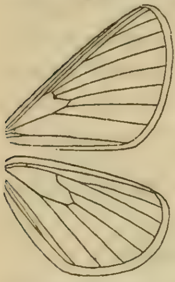

Fig. 13. *Hemijana subrosea* ♂.

*1. *H. subrosea* Auriv. Ent. Tidskr. 14 p. 209 (1895). — Pl. 3 Fig. 3 ♂.
Natal. Transvaal.

13. Jana Walk.

= *Jana* Herr. Sch. Aussereur. Schm. t. 21 f. 98 (1854); nom. nudum.

= *Jana* Walker List 4 p. 909 (1855). — Herr. Sch. Aussereur. Schm. p. 17—18 (1856); typus *J. eurymas* H. Sch.

Proboscis aborted. Palpi more or less upturned, distinctly reaching beyond the frons, densely clothed with hairs. Antennæ rather short, not reaching to the apex of the cell of fore wing, bipectinate; the branches moderately long in the male, short in the female. Fore tibiæ unarmed, hind tibiæ with 4 long spurs. Wings ample and very broad. Fore wing with vein 3 nearly from the middle between 2 and 4, 5 half way between 4 and 6 or a little nearer to 4, 6 from well below upper angle of cell or rarely from upper angle of cell, 7 + 8 + 9 stalked from upper angle of cell, 10 absent, 11 free from well before upper angle; lower discocellular straight (except in N:o 10), not longer than the middle discocellular, which is nearly erect and slightly angled at both its ends or in the middle; upper discocellular usually distinct, rarely absent; the cell is most prominent at vein 5 or at least hardly more prominent at 4 than at 5. Hind wing with vein 3 from the middle between vein 2 and 4 or nearer to 2, 5 from the middle between 4 and 6, 6 well separated from

7 and vein 8 arched at base and connected with the cell by an oblique bar; the lower discocellular is straight and a little longer than, nearly as long as or shorter than the middle discocellular, which is slightly angled at its upper end; upper discocellular straight and rather long. Frenulum and retinaculum present in the male, absent or rudimentary in the female.

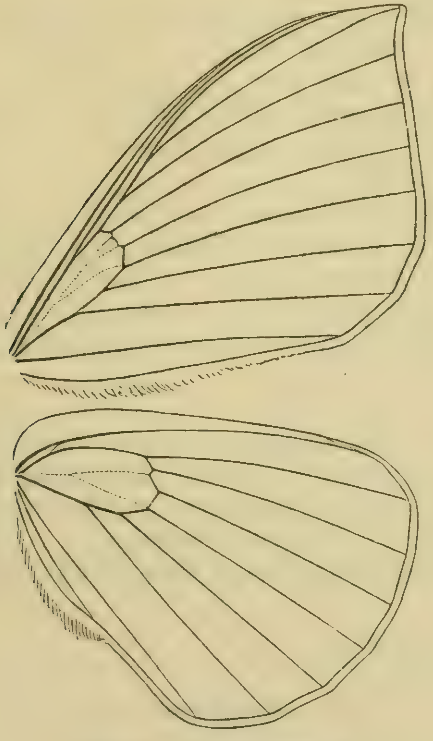

Fig. 14. *Jana eurymas* ♀.

1. *J. strigina* Westw. Proc. Zool. Soc. London 1849 p. 37 (1849). — Walker List 4 p. 913 (1855). — Auriv. Ent. Tidskr. 14 p. 206 (1893).
   Sierra Leone.
2. *J. camerunica* Auriv. Ent. Tidskr. 14 p. 206 (May 1893); ? = *strigina* var. *nobilis* Holl Psyche 6 p. 515 t. 20 f. 7 (Sept. 1893).
   Camerun — Ogove.

*3. *J. eurymas* Herr. Sch. Aussereur. Schm. t. 21 f. 98 (1854). — Walk. List 4. p. 910 (1855).
Camerun. Ogove. Natal.

4. *J. preciosa* Auriv. Ent. Tidskr. 14 p. 207 (1893).
Camerun. Congo.

5. *J. obscura* Auriv. Ent. Tidskr. 14 p. 208 (1893). — Pl. 3 Fig. 2 ♂.
Ashanti. Congo: Uelle.

6. *J. tantalus* Herr. Sch. Aussereur. Schm. t. 21 f. 99, 100 (1854). — Walker List 4 p. 913 (1855).
signifera Walker List 4 p. 911 (1855).
crepax Wallengr. Wien. Ent. Mon. 4 p. 166 (1860); Vet. Akad. Handl. 5: 4 p. 28 (1865).
South Africa.

7. *J. gracilis* Walker List 4 p. 913 (1855). — Pl. 3 Fig. 1 ♂.
polymorpha Auriv. Ent. Tidskr. 14 p. 207 (1893).
Ashanti. Camerun. Congo.

8. *J. gabunica* Auriv. Ent. Tidskr. 13 p. 195 (1892);
marmorata Holland Psyche 6 p. 346 t. 20 f. 2 (Sept. 1893).
Gabun.

Differs from all other species of this genus by the lower discocellular of both wings being a little longer than the middle discocellular and may perhaps be taken as the type of a separate genus.

*9. *J.?? chalepteryx* Felder Reise Novar. Lep. t. 98 f. 10 (1868).
»Cape Colony».

14. **Hoplojana** n. gen.

Nearly allied to *Jana* and only differing in the following points: Antennæ reaching the apex of the cell of fore wing. Fore tibiæ short, armed at the tip with 1 or 2 spines, one curved, the other straight but very short. Fore wing sometimes with vein 3 from nearer to 4 than to 2, 6 from upper angle of cell; lower discocellular straight not longer than the middle discocellular, which is slightly angled near its middle, upper discocellular often absent. Hind wing usually with vein 3 from nearer to 4 than to 2; lower discocellular a little shorter than the middle discocellular, both nearly straight.

*1. *Hoplojana indecisa* AUR. Ent. Tidskr. 22 p. 120 fig. 21 (1901).
German East Africa: Lindi.
2. *H. tripunctata* AURIV. Ent. Tidskr. 18 p. 221 (1897). — Pl. 4 Fig. 1.
Nyasa-Land.
3. *H. rhodoptera* GERST. Archiv f. Naturg. 37 p. 361 (1871); v. d. Deckens Reise 3: 2 p. 381 t. 16 f. 3 (1873).
German and British East Africa.

15. **Acrojana** n. gen.

Proboscis aborted. Palpi upturned, densely scaled; third joint short and rounded. Antennæ moderate, bipectinate; the branches of moderate lenght in the male, short in the female. Fore tibiæ normal, densely clothed with long hairs, unarmed; hind tibiæ with four spurs. Wings broad and ample, densely scaled. Fore wing with vein 3 nearly from the middle between 2 and 4, 5 from the middle between 4 and 6, 6 from near upper angle of cell, 7 + 8 + 9 stalked from upper angle, 10 absent, 11 from just before upper angle of cell; vein 9 runs to the apex of the wing and 8 to the outer margin well below the apex; the lower discocellular is straight, somewhat oblique and much shorter than the middle discocellular, which is straight and very oblique; upper discocellular rather long and very oblique. Hind wing with vein 3 from the middle between 2 and 4, 5 a little nearer to 4 than to 6,

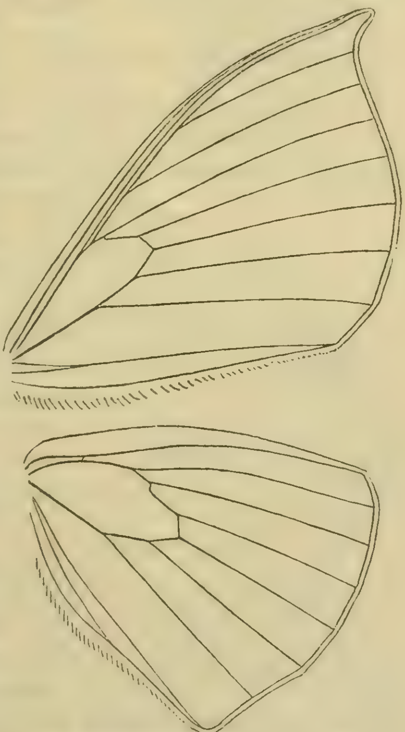

Fig. 15. *Arcojana sciron* ♀.

6 remote from 7 at its origin, 8 slightly arched at base and connected with the cell by a short bar; lower discocellular straight and nearly erect; middle discocellular much longer than the lower discocellular and slightly angled near its upper end; upper discocellular straight and almost as long as the lower discocellular. Frenulum and retinaculum distinct in the male, absent in the female.

*1. *A. sciron* Druce Proc. Zool. Soc. London 1887 p. 676 (1888). — Pl. 1 ♀; Pl. 2. Fig. 3 ♂.
Sierra Leone (Coll. Staudinger). Camerun.

°2. *A.(?) rosacea* Butler Lep. Exot. p. 80 t. 30 f. 3 (1871).
Ashanti.

16. **Camerunia** Auriv.

= *Camerunia* Auriv. Ent. Tidskr. 14 p. 211 (1893).

Proboscis at least in the male present, but short. Palpi upturned, reaching a little beyond the frons; last joint rudimentary. Antennæ rather short, not reaching the apex of the cell of fore wing, bipectinate; the branches slender, rather short in male, still shorter in female. Fore tibiæ normal, unarmed; hind tibiæ with four long spurs. Wings moderatily broad, densely hairy or lanate at base, more thinly clothed beyond middle. Fore wing with vein 3 issuing much nearer to 4 than to 2, 5 in the middle between 4 and 6, 6 from upper angle of cell, 7 + 8 + 9 stalked from upper angle, 8 running to the apex, 10 absent, 11 free from cell very near to its upper angle; lower and middle discocellular of nearly the same length, not or slightly angled, moderatily oblique. Hind wing with vein 3 from nearer 4 than 2, 5 from little nearer to 4 than 6, 6 and 7 stalked, 8 connected with the cell by a bar near the base; lower discocellular straight and much shorter than the middle discocellular,

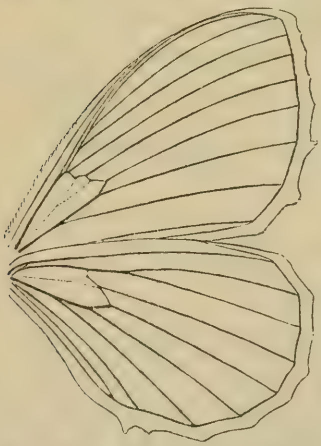

Fig. 16. *Camerunia orphne* ♀.

which is more oblique and slightly angled nearer its upper end. Retinaculum absent; frenulum weak and rudimentary in the male, absent in the female.

*1. *C. orphne* SCHAUS Coll. S. Leone Lep. p. 30 t. 1 f. 7 (before May 1893);
insignis AURIV. Ent. Tidsk. 14 p. 211 (May 1893).
Sierra Leone. Camerun. Gabun.

2. *C. albida* n. sp. — Fig. 17 ♂. — Alba antennis nigris, fasciculis duobus frontis ad basin antennarum, palpis fasciculoque anali abdominis flavescentibus, pedibus flavescente brunneis, abdomine supra brunnescente pilis albis vestito; alis tenuiter squamosis pone medium lineis duabus communibus, transversis undatis, fasciaque valde irregulari marginali fuscescentibus; linea transversa interiore ad costam 3:am alarum anticarum in plagam irregularem dilatata; alis anticis maculis tribus nigro-fuscis ad apicem cellulæ. Long. alar. exporr. 53 mm.
German East Africa: Nyangao. — Museum Holmiæ.

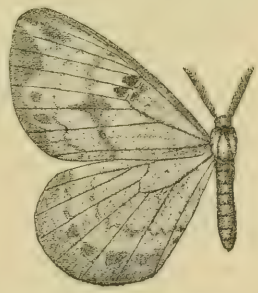

Fig. 17. *Camerunia albida* ♂.

*3. *C.(?) bimaculata* DEW. Mitth. Münch. Ent. Ver. 3 p. 33 t. 2 f. 5 (1879).
Angola.

17. **Epijana** HOLL.

= *Epijana* HOLL. Psyche 6 p. 514 fig. (1893).

Proboscis aborted(?). Palpi porrect or slightly upturned, reaching a little beyond the frons, densely clothed with scales; last joint minute. Antennæ reaching beyond the apex of the cell of fore wing, bipectinate; the branches slender, moderately long in the male, very short in the female. Fore tibiæ normal, unarmed; hind tibiæ with 4 long spurs. Wings moderately broad, heavily clothed with hairs and scales. Fore wing with vein 3 from well before angle of cell, 5 from the middle between 4 and 6, 6 stalked with

7 + 8 + 9, 10 absent, 11 either free from just before apex of cell, lying close up to the stalk of 6 + 7 and then anastomosing with 8 + 9 forming a very narrow, linear areole and finally uniting vein 9 and 12 as a very short bar or anastomosing with the stalk of 6 + 7 + 8 + 9 from its origin and only visible as a very short bar between vein 9 and 12; lower discocellular straight and nearly erect, distinctly shorter than the middle discocellular, which is more oblique and angled near its upper end. Hind wing with vein 3 from well before angle of cell, 5 nearly from the middle between 4 and 6, 6 and 7 stalked, 8 arched at base and connected with the cell by a bar; lower discocellular straight and slightly oblique; middle discocellular much longer and very oblique, angled near its upper end. Retinaculum absent, frenulum rudimentary in the male, absent in the female.

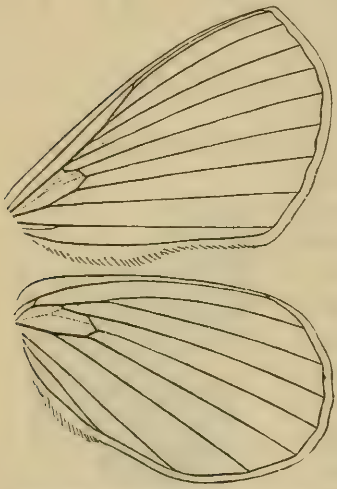
Fig. 18. *Epijana cosima* ♀.

*1. *E. cosima* Plötz Stett. Ent. Zeit. 41 p. 85 (1880);
lanosa Holl. Psyche 6 p. 514 fig. (1893);
velutonia Druce An. N. H. (6) 17 p. 355 (1896).
Camerun. Gabun.

2. *E. cinerea* Holl. Psyche 6 p. 515 (1893).
Gabun: Ogove.

18. **Phasicnecus** Butler.

? = *Stenoglene* Felder Reise Novar. Lep. Het. p. 9 t. 95 f. 3 (1874); type *hilaris* Feld. — nom. nudum![1]

= *Phasicnecus* Butler Proc. Zool. Soc. 1894 p. 585 (1894); type *Ph. Gregorii*.

Proboscis aborted. Palpi minute, porrect, not reaching beyond the frons; last joint very minute, rounded. Antennæ nearly reaching to the apex of the cell of fore wing, bipectinate; the branches slender and rather long in the male, short in the female. Fore tibiæ normal, unarmed; hind tibiæ with 4 spurs. Wings broader in the males. Fore wing with vein 3 from well before angle of cell, 5 from the middle between 4 and 6, 6 from the stalk of 9 + (7 + 8), 7 and 8 stalked together from 9, 10 absent, 11 anastomosing with 9 to far beyond the stalk of 7 + 8 and then forming a very short bar between 9 and 12, rarely free at base and forming a very narrow, linear areole (fig. 20); the lower discocellular straight and nearly erect; the middle discocellular very oblique and shortly angled at its upper end, much longer than the lower. Hind wing with vein 3 from well before angle of cell, 5 nearly in the middle between 4 and 6, 6 and 7 stalked, 8 nearly straight and near base connected with the cell by a bar; the discocellulars oblique, nearly of equal length or the middle longer than the lower. Frenulum and retinaculum absent in both sexes.

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[1] There is no description, and from the figure it is impossible to determine the genus; *S. hilaris* is unknown to me and must be a very rare form.

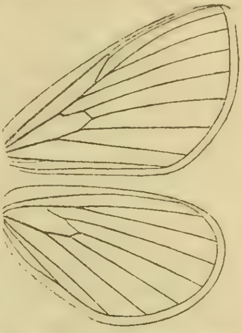

Fig. 19. *Phasicnecus obtusus* ♀.

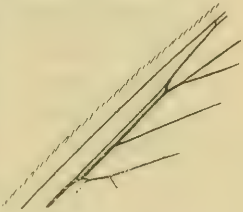

Fig. 20. *Phasicnecus sigyna.* Part of fore wing with the linear areole.

This genus is very nearly allied to *Epijana* and seems only to differ by vein 7 and 8 of fore wing being emitted on a common stalk from 9.

1. *Ph. sigyna* Auriv. Ent. Tidskr. 14 p. 209 (1893). — Pl. 4 Fig. 2.
   Camerun.
2. *Ph. Preussi* Auriv. Ent. Tidskr. 14 p. 209 (1893). — Pl. 4 Fig. 3.
   Camerun.
3. *Ph. roseus* Druce Proc. Zool. Soc. 1886 p. 410 t. 38 f. 3 (1886).
   Congo. Delagoa Bay.

*4. *Ph. Gregorii* Butler Proc. Zool. Soc. 1894 p. 586 t. 37 f. 6 (1894); ? = *roseus* Dr. var.
   Brit. East Africa: Sabaki Valley.

°5. *Ph. labda* Druce Proc. Zool. Soc. 1887 p. 677 (1888).
Nyasa Land.

6. *Ph. citrinus* Druce Proc. Zool. Soc. 1886 p. 410 t. 38 f. 4 (1886).
Old Calabar.

7. *Ph. obtusus* Walk. List 31 p. 357 (1864);
♀ *tristis* Felder Reise Novar. Lep. t. 95 f. 4 (1868).
Natal.

°8. *Ph. hilaris* Felder Reise Novar. Lep. t. 95 f. 3 (1868).
Natal.

9. *Ph. bithynia* Druce Proc. Zool. Soc. 1887 p. 676 (1888).
Delagoa Bay.

°10. *Ph.(?) pira* Druce An. N. H. (6) 17 p. 354 (1896).
German East Africa: Dar es Salaam.

°11. *Ph.(?) nahor* Druce An. N. H. (6) 17 p. 354 (1896).
Caffraria: Umtata.

°12. *Ph.(?) bicolor* Dist. An. N. H. (6) 20 p. 206 (1897).
Transvaal.

°13. *Ph.(?) thelda* Druce Proc. Zool. Soc. 1887 p. 677 (1888).
Camerun.

19. **Drepanojana** Auriv.

= *Drepanojana* Auriv. Ent. Tidskr. 14 p. 212 (1893).

Proboscis short and weak, but distinct. Palpi minute, porrect or slightly upturned, not reaching beyond the frons. Antennæ short, bipectinate with slender branches. Fore tibiæ unarmed, hind tibiæ with four spurs. Wings broad, rather thinly clothed with scales. Fore wing with the apex acute, emarginate below apex and broadly convex between vein 5 and the hind angle. Hind wing nearly triangular with the hind angle very distinct. Neuration completely as in *Phasicnecus*. Frenulum and retinaculum absent at least in the female.

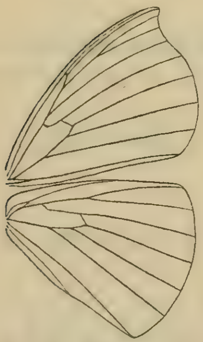

Fig. 21. *Drepanojana fasciata* ♀.

*1. *D. fasciata* Auriv. Ent. Tidskr. 14 p. 212 (1893). — Pl. 5 Fig. 2.
Sierra Leone.

°2. *D. mæonia* Druce An. N. H. (6) 17 p. 353 (1896); ? = N:o 1. Old Calabar.

20. Viana Walker.

= *Viana* Walker Trans. N. Hist. Soc. Glasgow 1 p. 340 (1869); type *velutina*.

= *Gonojana* Auriv. Ent. Tidskr. 14 p. 212 (1893); type *G. dimidiata*.

Proboscis short and weak. Palpi porrect, hardly reaching beyond the frons, more densely scaled in the male than in the female. Antennæ hardly reaching the apex of the cell of fore wing, bipectinate; the branches rather long and slender in the male, short in the female. Fore tibiæ unarmed, hind tibiæ with 4 spurs. Wings moderately broad, more densely scaled in the male than in the female. Fore wing with the outer margin very convex; the apex broadly rounded in the male, acute and slightly falcate in the female. Hind wing with the outer margin produced at vein 3 into a short and obtuse tail in the male, broadly and obtusely angled at the same point in the female. Fore wing with vein 3 from well before angle of cell, 5 from the middle between 4 and 6 or a little nearer to 4, 6 from the long stalk of 7 and 8, this stalk emitted from vein 9 near the upper angle of cell, 10 absent, 11 anastomosing with 9 and then forming a short bar between 9 and 12; lower discocellular straight and nearly erect; middle discocellular slightly curved, oblique and hardly longer than the lower discocellular. Hind wing with vein 3 from well before angle of cell, 5 from the middle between 4 and 6 or a little nearer to 4, 6 and 7 on a long stalk, 8 nearly straight and connected with the cell by a bar; lower discocellular straight

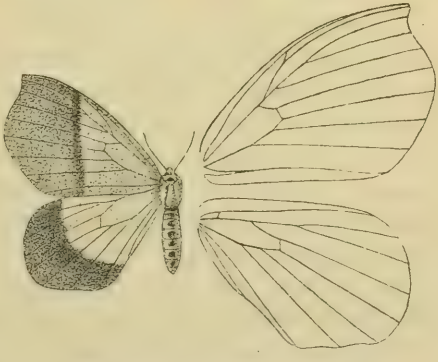

Fig. 22. *Viana dimidiata* ♀.

and nearly erect; middle discocellular very oblique, nearly straight and much longer than the lower discocellular. Frenulum and retinaculum present but feebly developed in the male, absent in the female.

The above description is made from *V. dimidiata.*

*1. *V. velutina* Walker Trans. N. Hist. Soc. Glasgow 1 p. 340 (1869).
Congo.

2. *V. dimidiata* Aur. Ent. Tidskr. 14 p. 212 (May 1893) ♂, ♀. — Pl. 5 Fig. 4 ♂.
♀ *tenuis* Holl. Psyche 6 p. 515 (Sept. 1893).
Camerun. · Gabun.

3. *V.(?) tristis* Druce An. N. H. (6) 17 p. 355 (1896).
Gambia.

After I had nearly finished this work, I received Hampsons paper on the fam. *Sabaliadæ* and have also been able to look through the collection of Striphnopterygidæ in the Museum für Naturkunde in Berlin.

It may here only be remarked, that the peculiar new genus *Spiramiopsis* Hamps. belongs to the *Striphnopteryginæ* and must be placed between *Poloma* and *Phyllalia.* It differs from *Poloma* by having vein 8 of hind wing approximated to 7 beyond the cell, from *Phyllalia* by having 4 spurs on the hind tibiæ and from both by the presence of vein 10 of fore wing and by the shape of the cell of hind wing.

»*Dreata*» *bimaculata* Dew. agrees in neuration very nearly with *Camerunia* and differs essentially only by the lower and middle discocellulars of fore wing forming together an even curve, from the middle of which vein 5 is emitted.

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[1] A classification of a new family of the Lepidoptera. — Tr. Ent. Soc. London 1901 p. 187—192.

Explanation of the plates.

Plate 1.

Fig. 1. *Acrojana sciron* DRUCE ♀.

Plate 2.

Fig. 1. *Phyllalia Thunbergi* BOISD. ♂.
» 2. *Poloma nigromaculata* AUR. ♂.
» 3. *Acrojana sciron* DRUCE ♂.

Plate 3.

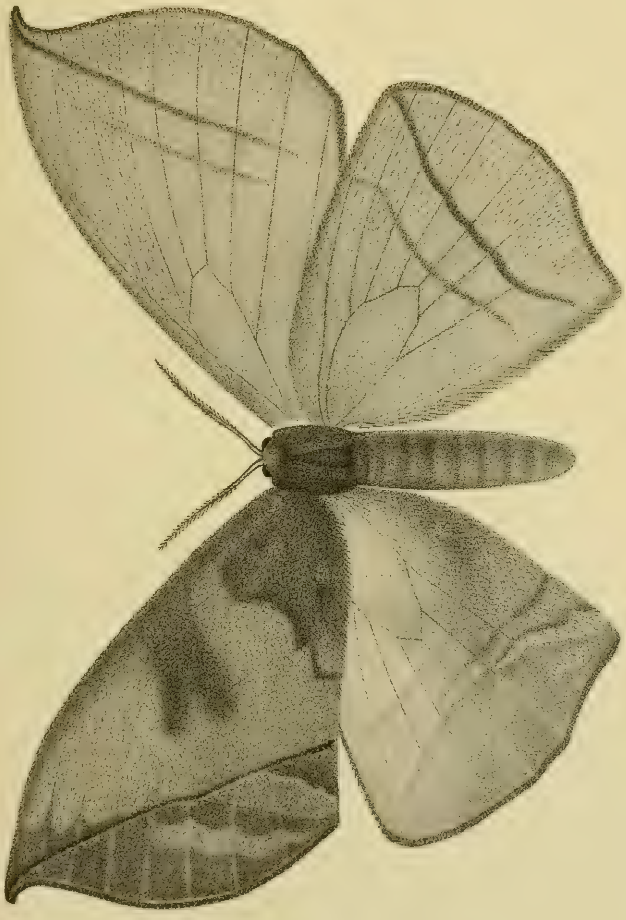
Fig. 1. *Jana gracilis* WALK. ♂.
» 2. » *obscura* AUR. ♂.
» 3. *Hemijana subrosea* AUR. ♂.
» 4. *Trichophiala Devylderi* AUR. ♀.

Plate 4.

Fig. 1. *Hoplojana tripunctata* AUR. ♂.
» 2. *Phasicnecus sigyna* AUR. ♂.
» 3. » *Preussi* AUR. ♂.

Plate 5.

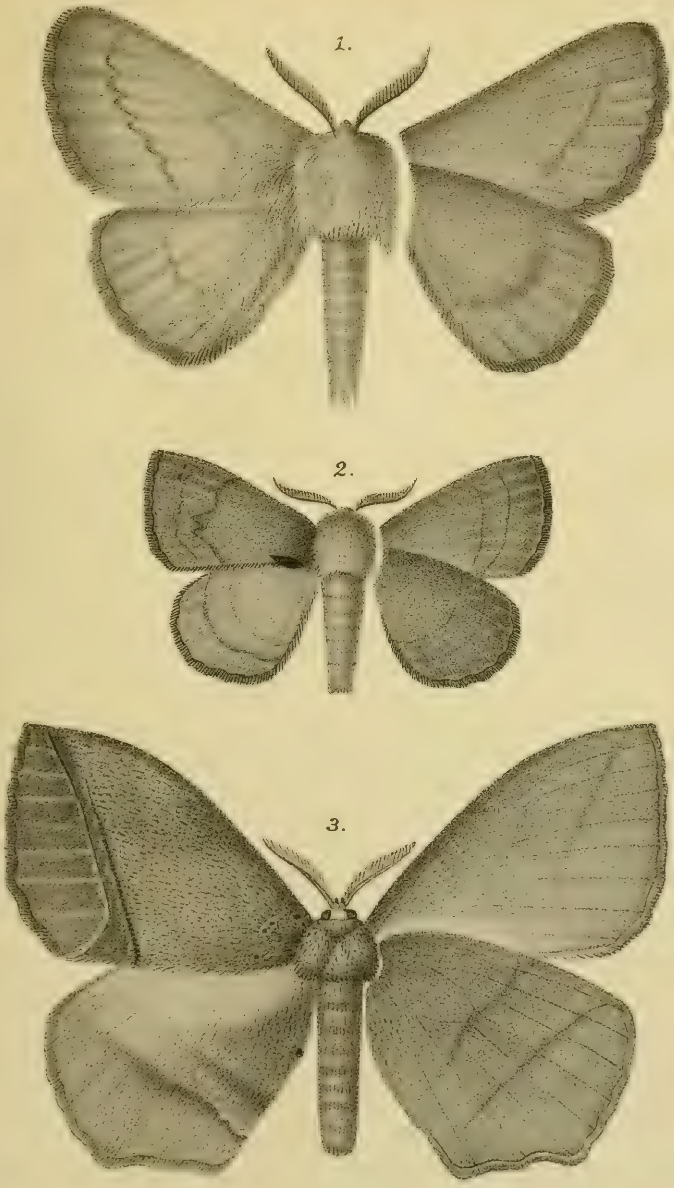
Fig. 1. *Lichenopteryx despecta* FELD. ♀.
» 2. *Drepanojana fasciata* AUR. ♀.
» 3. *Schistissa uniformis* AUR. ♂.
» 4. *Viana dimidiata* AUR. ♂.



Acrojana sciron DR. ♀.

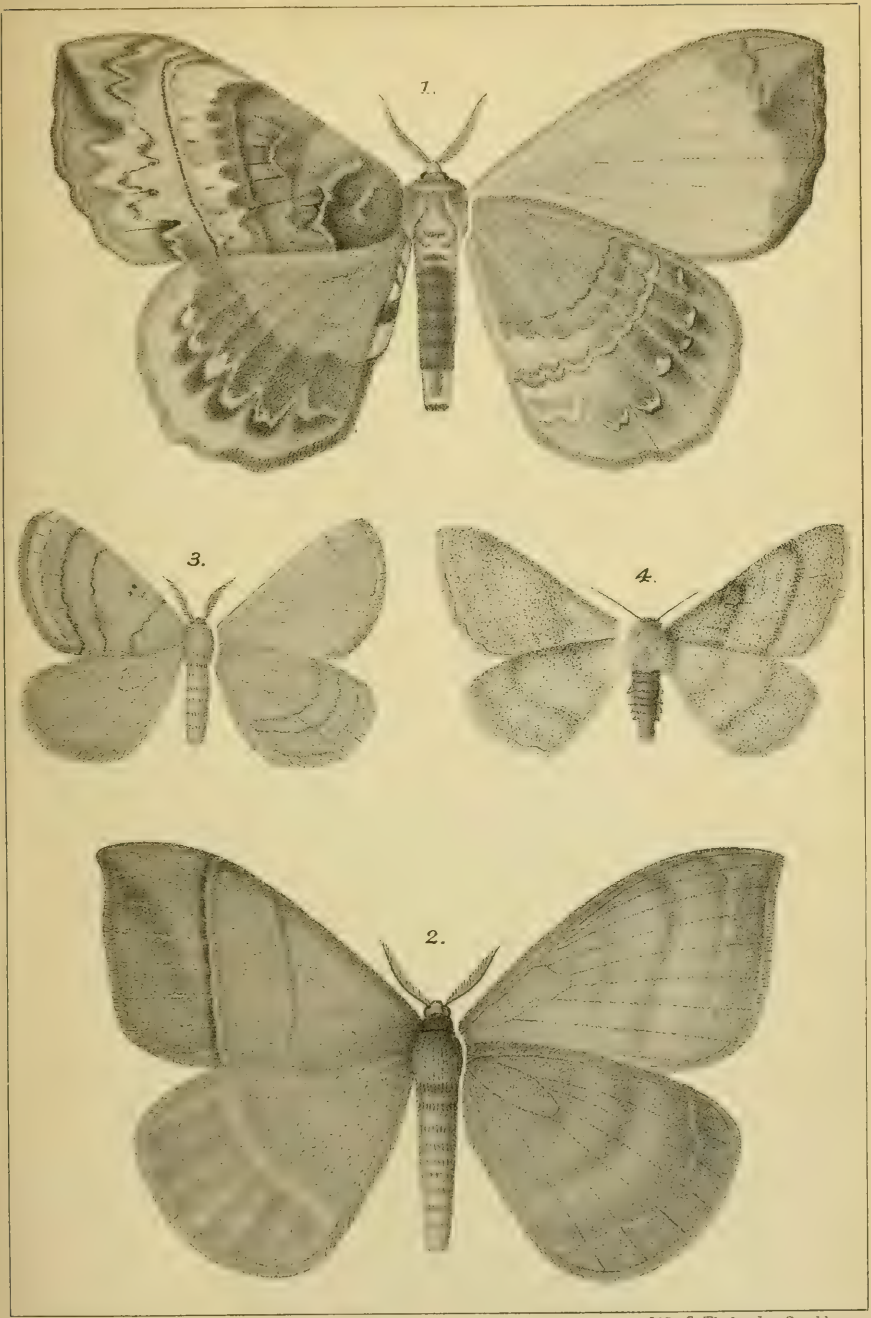
A. Ekblom del.

Lith. G. Tholander, Stockholm.



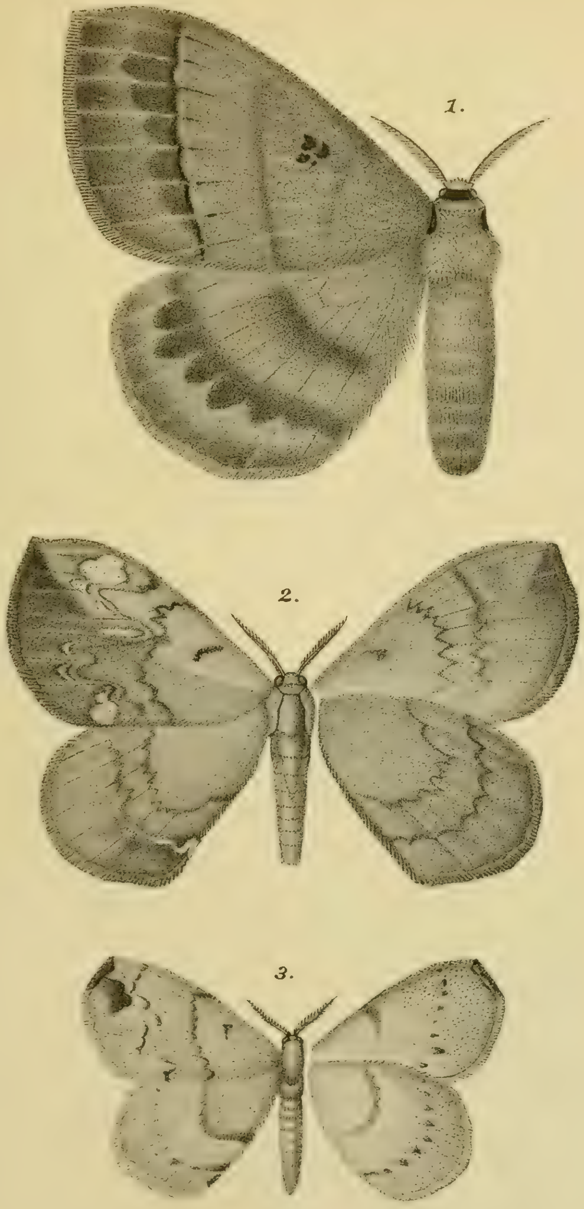
A. Ekblom del.
Lith. G. Tholander, Stockholm.

1. Phyllalia Thunbergi BOISD ♂. 2. Poloma nigromaculata AUR. ♂
3. Acrojana Sciron DR. ♂.



A. Ekblom del.
Lith. G. Tholander, Stockhom

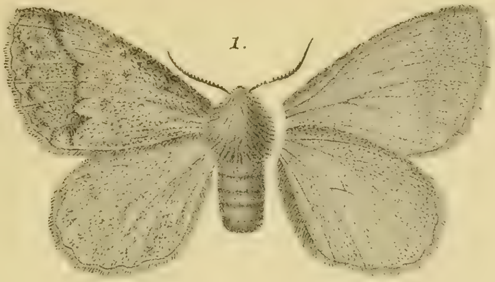
1. Jana gracilis WALK. ♂. 2. J. obscura AUR. ♂.
3. Hemijana Subrosea AUR. ♂. 4 Trichophiala Devylderi AUR. ♀.



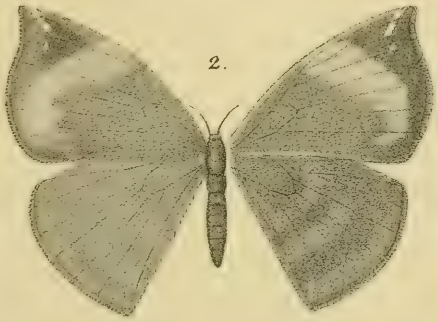
A. Ekblom del. Lith. G. Tholander, Stockholm.

1. Jana tripunctata AUR. ♂. 2. Phasicnecus sigyna AUR ♂.
3. Phasicnecus Preussi AUR. ♂.

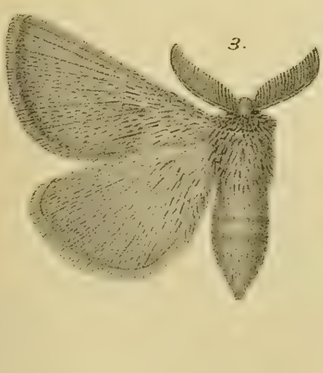
1.



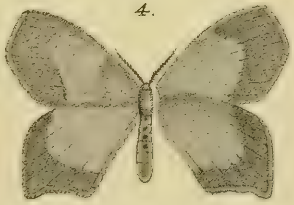
2.



3.



4.



A. Ekblom del. Lith. G. Tholander, Stockholm.

1. Lichenopteryx despecta FELD. ♀. 2. Drepanojana fasciata AUR. ♀.
3. Schistissa uniformis AUR. ♂. 4. Viana dimidiata AUR. ♂.

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 8.

ARCTIC CRUSTACEA

COLLECTED DURING THE SWEDISH ARCTIC EXPEDITIONS 1898, 1899 AND
1900 UNDER THE DIRECTION OF PROFESSOR A. G. NATHORST
AND MR. G. KOLTHOFF

II.

DECAPODA, SCHIZOPODA

BY

AXEL OHLIN.

WITH 3 PLATES.

COMMUNICATED OCTOBER 9, 1901.
REVISED BY HJ. THÉEL AND CHR. AURIVILLIUS.

◆

STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1901

In this paper I am going to continue with the enumeration and description of Arctic Crustaceans collected mainly on Professor A. G. NATHORST's expeditions in the years 1898 and 1899 to Spitzbergen and East Greenland resp. In my previous paper[1] I have given some information as to the purpose of, and the zoological work done during those voyages, therefore I think it unnecessary here to reiterate it. But, besides the material collected during those trips, I had at my disposal the rather large collection of crustaceans obtained during the Swedish Zoological Arctic Expedition of 1900 under the direction af Mr. G. KOLTHOFF, of the University of Upsala. This eminent ornithologist equipped an expedition to Spitzbergen, Jan Mayen, and East Greenland, mainly for the purpose of making collections of vertebrates and of studying their biology. But the other branches of zoological science were not neglected by this zealous naturalist. He, therefore, engaged, to study the marine fauna, Mr. HJ. ÖSTERGREN, M. A., who has contributed by his valuable papers to an increased knowledge of the Holothurians, and Mr. TH. ODHNER, B. A., who acted as his assistant. These gentlemen dredged and trawled at no less than 30 stations, most of them, viz. stat. 16—28, situated off East Greenland, mainly in the neighbourhood af Franz Joseph's Fiord. Stations 1—12 are situated off the west coast of Spitzbergen, 13—14 off Jan Mayen, and 29—30 in the deep basin between East Greenland and Jan Mayen. Some interesting deep-sea crustaceans were also obtained by means of the vertical towing-net from depths up to 3000 meters.

When the collections of Mr. KOLTHOFF's expedition were handed to me, most of the decapods were already determined by Dr. E. LÖNNBERG, of the University of Upsala. Therefore it is only a few of the more interesting of these forms which I have myself examined. Those determined by Mr. LÖNNBERG

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[1] This journal, Bd. 26 (1900), Afd. IV, n:o 12. Printed 1901.

I have marked with »*det.* Lönnberg». I take advantage of this opportunity of offering him my best thanks for the kindness with which he placed at my disposal his notices about the localities of the species determined by him.

Here as in my preceding paper, I have also examined a small collection of Decapoda collected by Mr. Th. Wulff, M. A., on his trip to Spitzbergen with the Swedish-Russian Expedition for measuring latitudes, in the summer of 1899.

The collections of the Arctic Expeditions 1898 and 1899 belong to the »Riksmuseum», (State Museum) at Stockholm, those of the Expedition 1900 to the University Museum at Upsala, and Mr. Wulff's collection to the University Museum of Lund, which collections have been kindly placed at my disposal by the resp. directors, Professors Hj. Theél, T. Tullberg, and A. W. Quennerstedt. To Prof. A. G. Nathorst, who first asked me tho work up these collections, I also wish to express here my great gratitude.

Our knowledge of the carcinological fauna of East Greenland and the seas East of Spitzbergen, round King Charles' Land, has been considerably augmented by these expeditions. As far as I know, the only papers treating of East Greenlandian crustaceans are Buchholz' important memoir in »Zweite Deutsche Nordpolarfahrt in den Jahren 1869 und 1870 etc.» 1874 and a short list of Hansen, viz. »Pycnogonider og Malacostrake Krebsdyr» in »Meddelelser om Grönland», Bd. XIX, 1895.

The following *Decapoda* and *Schizopoda* are recorded by those authors as occurring off that coast, viz. *Selerocrangon boreas* (Phipps), *Selerocrangon ferox* (G. O. Sars), *Nectocrangon lar* (Owen), *Hippolyte turgida* Kröyer, *Hippolyte polaris* (Sabine), *Hippolyte groenlandica* (J. C. Fabricius),? *Hippolyte incerta* Buchholz, *Bythocaris Panschii* (Buchholz), *Hymenodora glacialis* (Buchholz), *Nyctiphanes norvegica* (M. Sars), *Rhoda Raschii* (M. Sars), and *Mysis oculata* (O. Fabricius).

This list must now be increased by the following species, viz. *Sabinea septemcarinata* (Sabine), *Bythocaris simplicirostris* G. O. Sars, *Bythocaris Payeri* (Heller), *Hippolyte Gaimardi* H. Milne Edwards, *Hippolyte spinus* (Sowerby), *Rhoda inermis* (Kröyer), *Boreomysis nobilis* G. O. Sars, *Pseudomma roseum* G. O. Sars, *Pseudomma Théeli* n. sp., *Erythrops abyssorum* G. O. Sars, *Erythrops glacialis* G. O. Sars, *Parerythrops* *robusta* (Smith), *Parerythrops spectabilis* G. O. Sars, *Mysideis grandis* (Goës). and *Mysis mixta* Lilljeborg.

Thus, the number of *Decapoda* and *Schizopoda* known from the East Greenlandian seas is, by the Swedish Expedition, raised from 11 (12?) up to 26 (27?) species. Further researches will, no doubt, still more increase their number and prove that that part of the Arctic Sea is as rich in crustaceans as the rest. However, it is worth while remarking the strange fact that some species which are elsewhere rather common in the Arctic, have not as yet been obtained off East Greenland. Such species are f. i. *Hyas araneus* (Linné), *Hyas coarctatus* Leach, *Eupagurus pubescens* (Kröyer) and *Pandalus borealis* Kröyer. Other species as *Hippolyte turgida* Kröyer and *Hippolyte groenlandica* (J. C. Fabricius) seem to be very scarce, as they were obtained at only a very few stations out of about fifty where dredgings were carried on by the expeditions in 1899 and 1900. Farther below, in the special description, I have remarked such strange occurrences in the geographical distribution.

As is well known, the seas round Spitzbergen, Franz Joseph Land, and Nova Zembla, have been much better explored, and belong, doubtless, to the best known, in a zoological respect, of all parts of the Arctic Ocean. It would increase the length of this paper very much, if I tried to write an historical review of the expeditions which have brought home carcinological material from those regions. I content myself, therefore, with referring the reader to the bibliography, where he will find a somewhat exhaustive list of papers dealing with the malacostracous fauna of those seas.

Strangely enough, there was, however, a restricted area of Barents Sea which was nearly unknown until 1898. I mean the sea E. of Spitzbergen, round King Charles' Land. It was only once, in 1889, that it was visited by naturalists. In that year, Kükenthal and Walter spent the summer in dredging and trawling in that sea. The material is not yet fully worked out. According to Doflein l. c. p. 323, Pfeffer within a short time, is going to publish the results of his examination of the *Decapoda*. In 1898, no less than three expeditions visited the sea E. of Spitzbergen, viz. the Swedish Expedition on board the »Antarctic», the German »Helgoland» Expedition, and that of the Prince of Monaco on board the »Prin-

	Cold Area of North Atlantic.	Jan Mayen.	East Greenland.	West Greenland.	Smith Sound.	Baffin Land.	Labrador and East Coast of N. America.	Polar Archipelago of N. America.	Behring Sea.	Siberian Polar Sea.
Decapoda.										
Hyas araneus (LINNÉ)	—	—	—	+	—	—	+	—	—	—
» coarctatus LEACH	—	—	—	+	—	—	—	—	+ ?	—
Eupagurus pubescens (KRÖYER)	—	—	—	+	—	—	+	—	—	—
Anapagurus lævis (THOMPSON)	—	—	—	—	—	—	—	—	—	—
Sclerocrangon boreas (PHIPPS)	—	—	╫[1]	+	+	+	+	+	—	—
» ferox (G. O. SARS)	—	+	╫	+	—	—	—	—	—	—
Crangon Allmanni KINAHAN	—	—	—	—	—	—	—	—	—	—
Cheraphilus echinulatus (M. SARS) . . .	—	—	—	—	—	—	—	—	—	—
Pontophilus norvegicus M. SARS	+	—	—	+	—	—	+	—	—	—
» spinosus (LEACH)	—	—	—	—	—	—	—	—	—	—
Nectocrangon lar (OWEN)	—	—	╫	+	+	+	+	+	+	—
Sabinea septemcarinata (SABINE)	—	—	╫	+	—	—	+	—	—	—
Bythocaris simplicirostris G. O. SARS . .	—	—	╫	—	—	—	—	—	—	—
» leucopis G. O. SARS	╫	—	—	—	—	—	—	—	—	—
» Payeri (HELLER)	—	╫	╫	—	—	—	—	—	—	—
Hippolyte Gaimardii H. M. EDW. . . .	—	—	╫	+	+	+	+	+	+	+
» spinus (SOWERBY)	—	—	╫	+	+	+	+	—	+	—
» turgida KRÖYER	—	—	╫	+	+	+	+	+	+	+
» pusiola KRÖYER	—	—	—	—	—	—	+	—	—	—
» polaris (SABINE)	—	—	╫	+	+	+	+	—	+	—
» groenlandica (J. C. FABRICIUS)	—	—	╫	+	+	+	+	+	+	—
Pandalus borealis KRÖYER	—	—	—	+	—	—	+	—	+	—
Pasiphæa tarda KRÖYER	╫	—	—	+	—	—	+	—	—	—
Hymenodora glacialis (BUCKHOLZ) . . .	╫	—	╫	—	—	—	—	—	—	—
Schizopoda.										
Nyctiphanes norvegica (M. SARS)	╫	+	╫	—	—	—	+	—	—	—
Rhoda inermis (KRÖYER)	—	+	╫	+	—	—	+	—	—	—
Thysanoëssa longicaudata (KRÖYER) . .	╫	—	—	+	—	—	+	—	—	—
Boreomysis nobilis (G. O. SARS)	+	—	╫	+	—	—	—	—	—	—
» scyphops G. O. SARS	—	—	—	—	—	—	—	—	—	—

╫ Indicates that the species has been obtained during the Swedish

Franz Joseph Land.	Kara Sea.	Barents Sea.	East Spitzbergen.	West Spitzbergen.	Murman Coast.	Finmark.	North-Sea coast of Norway.	Iceland.	British Islands.	Cattegat.	Baltic.	Mediterranean.	Vertical distribution (m.).	Notes.
—	+	+	—	╫	+	╫	+	+	+	+	—	—	10—250	(?) Kamtschatka and Ochotsk.
—	—	—	—	—	+	╫	+	—	+	+	—	—	10—250	
—	—	—	—	╫	+	╫	+	+	+	+	—	—	5—100	Puget Sound.
—	—	—	—	—	—	—	╫	—	+	—	—	+	100—200	Azores.
—	—	+	╫[1]	╫	—	+	—	—	—	—	—	—	5—100	[1] rare.
—	—	+	╫	╫	+	—	╫	—	—	—	—	—	100—1000	
—	—	—	—	—	+	+	╫	+	+	+	—	—	40—150	
—	—	—	—	—	—	—	╫	—	+	—	—		100—150	
—	—	—	—	╫	—	+	+	—	+	—	—	—	200—1229	
—	—	—	—	—	—	—	╫	—	+	+	—	+[1]	60—150	Adria.
—	—	—	—	—	—	—	—	—	—	—	—	—	10—250	
—	—	+	╫	╫	+	+	+	—	—	—	—	—	10—300	
—	—	—	—	+	+	+	+	—		—	—	—	250—900	
—	—	—	—	—	—	—	—	—	—	—	—	—	1750—2750	
+	—	+	—	╫	+	—	╫	—	—	—	—	—	200—2000	
+	—	+	╫	╫	+	╫	+	+	+	+	+	—	10—500	
—	—	+	╫	╫	+	╫	+[1]	—	+[1]	—	—	—	10—500	[1] Hippolyte Lilljeborgi.
+?	+	+	—	╫	+	╫	—	—	—	—	—	—	10—150	
—	—	—	—	—	+	╫	+	+	+	+	—	—	10—110	
+	+	+	╫	╫	—	+	+	—	+	+	—	—	10—600	
	—	—	—	—	—	—	—	—	—	—	—	—	10—500	
—	—	+	—	╫	—	+	╫	—	—	+	—	—	100—500	
—	—	—	—	—	—	—	+	—	—	—	—	—	?—3000	
—	—	—	—	—	—	—	—	—	—	—	—	—	?—6500	
—	—	—	—	╫	—	+	+	—	+	+	—	—	0—2000	Bay of Biscay, North Polar Basin.
—	—	—	—	╫	—	+	╫	—	+	—	—	—	0—2000	
—	—	—	—	—	—	+	+	—	+	—	—	—	0—1500	North Polar Basin.
—	—	—	—	—	—	—	—	—	—	—	—	—	200—1700	
—	—	—	—	—	—	—	—	—	—	—	—	—	2000—4000	Southern Ocean.

Arctic Expeditions 1898, 1899 or 1900 in the sea thus marked.

	Cold Area of North Atlantic.	Jan Mayen.	East Greenland.	West Greenland.	Smith Sound.	Baffin Land.	Labrador and East Coast of N. America.	Polar Archipelago of N. America.	Behring Sea.	Siberian Polar Sea.
Amblyops Crozetii WILLEMOES-SUHM	⧺	—	—	—	—	—	—	—	—	—
» Sarsi n. sp.	—	—	—	—	—	—	—	—	—	—
Pseudomma roseum G. O. SARS	—	+	⧺	—	—	—	+	—	—	—
» Théeli n. sp.	—	—	⧺	—	—	—	—	—	—	—
Erythrops Goësii (G. O. SARS)	—	—	—	+	—	—	+	—	—	—
» abyssorum G. O. SARS	—	+	⧺	+	—	—	—	—	—	—
» glacialis G. O. SARS	+	—	⧺	—	—	—	—	—	—	—
Parerythrops robusta (SMITH)	—	—	⧺	—	—	—	+	—	—	—
» spectabilis G. O. SARS	+	—	⧺	+	—	—	—	—	—	—
Mysideis grandis (GOËS)	—	—	⧺	+	—	—	—	—	—	—
Mysis oculata (O. FABRICIUS)	—	⧺	⧺	+	+	+	+	—	—	+[1]
» mixta LILLJEBORG	—	—	⧺	+	—	—	+	—	—	—
Pseudomysis abyssi G. O. SARS	+	—	—	—	—	—	—	—	—	—

cesse Alice». As far as I know, it is only the collections of *Decapoda*, obtained during the German Expedition, which are worked up by DOFLEIN. The result is published in »Fauna Arctica» l. c.

From the sea around King Charles' Land, from Hinlopen Strait, or from the Stor Fiord, the following species were collected: *Pandalus borealis* KRÖYER, *Sclerocrangon ferox* (G. O. SARS), *Sclerocrangon boreas* (PHIPPS), *Sabinea septemcarinata* (SABINE), *Hippolyte Gaimardii* H. MILNE EDWARDS, *Hippolyte pusiola* KRÖYER,? *Hippolyte turgida* KRÖYER, *Hippolyte spinus* (SOWERBY), *Hippolyte polaris* (SABINE), *Eupagurus pubescens* (KRÖYER) and *Hyas araneus* (LINNÉ). All these species were also collected from the sea E. of Spitzbergen during the Swedish Expedition 1898. I cannot add any other *Decapoda* to that list. Of *Schizopoda* only the common *Mysis oculata* (O. FABRICIUS) was obtained from King Charles' Land.

During the Swedish Arctic Expeditions trawlings were carried on at some stations in depths exceeding 1000 metres, and yielded some interesting forms. Among these, I wish

Franz Joseph Land.	Kara Sea.	Barents Sea.	East Spitzbergen.	West Spitzbergen.	Murman Coast.	Finmark.	North-Sea coast of Norway.	Iceland.	British Islands.	Cattegat.	Baltic.	Mediterranean.	Vertical distribution (m.).	Notes.
—	—	—	—	—	—	—	—	—	—	—	—	—	2000—3500	Southern Ocean.
—	—	—	—	ǂ	—	—	—	—	—	—	—	—	50—	
—	—	+[1]	—	—	—	+	+	—	—	—	—	—	150—1100	[1] Matotschkin schar.
—	—	—	—	—	—	—	—	—	—	—	—	—	220—	
—	+	+	—	ǂ	+	+	+	—	+	—	—	—	25—300	
—	+	—	—	—	—	+	+	—	—	+	—	—	110—550	
—	—	—	—	—	—	—	—	—	—	—	—	—	250—1100	
—	+	—	—	+	—	+	—	—	—	—	—	—	70—350	
—	—	—	—	—	—	—	—	—	—	—	—	—	250—760	
—	—	+	—	ǂ	—	+	—	—	—	—	—	—	10—200	
—	+	+	ǂ	ǂ	+	+	—	+	—	—	—	—	10—110	[1] W. of Tajmur Peninsula.
—	—	—	—	—	—	+	+	+	—	+	+	—	3—200	
—	—	—	—	—	—	—	—	—	—	—	—	—	2300—2700	

to point out the occurrence of *Amblyops Crozetii* WILLEMOËS-SUHM formerly obtained, only on the »Challenger» Expedition, off Crozet Islands in the Southern Ocean.

Although I fully agree with BOAS, when splitting up *Schizopoda* into two orders, viz. *Euphausiacea* and *Mysidacea*. I have in this paper, which does however not claim to be any classificatory essay, maintained the old system.

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Decapoda.

Brachyura.

Tribe **Oxyrhyncha.**

Fam. **Maiidæ.**

Hyas LEACH 1813.

1. **Hyas araneus** (LINNÉ).

1758. Cancer Araneus LINNÉ, Syst. Naturæ, Ed. X. I. p. 628.
1780. » » O. FABRICIUS, Fauna Groenl. p. 233, n:o 213.
1853. Hyas araneus, BELL, Hist. Brit. Stalk-eyed Crust. p. 31.
1882. » coarctatus var., HOEK, Crust. »Willem Barents». l. c. p. 3., Taf. I. Fig. 1.
1887. » araneus HANSEN, Dijmphna-Togtets zool. bot. Udbytte etc., l. c. p. 234.
1893. Hyas araneus RATHBUN, Catalogue of the Crabs of the Family Maiidæ etc. l. c. p. 67.
1894. Hyas araneus, A. MILNE EDWARDS et BOUVIER, Brachyures et Anomures l. c. p. 18.
1897. » » Var. hoeki Birula, Essai d'une faune des crustacés décapodes etc. l. c. p. 442.
1900. » » STEBBING, Arctic Crust. l. c. p. 2.

Localities:

in 1898:

stat. 3. lat. 74° 21′ N., long. 19° 15′ E., Beeren Eisland, depth 20 m., bottom temp. + 1,5 C., pebbles, Laminariæ and red algæ, 15/VI one young spec.

stat. 4. lat. 74° 21′ N., long. 19° 15′ E., Beeren Island, »South Harbour», depth 14—18 m., rocky bottom with algæ, pebbles, and sand. 17/VI, »common, grayish-brown, colour varying as to the bottom».

» 5. lat. 75° 49′ N., long. 24° 25′ E., between Beeren Island and Hope Island, depth 80 m., bottom temp. — 1,42°, rocky bottom, 21/VI, several spec.

» 16. Recherche Bay, between Reindeer Point and Fox Glacier, West Spitzbergen, depth 90 m., rocky bottom with soft, grayish-blue clay, 8/VII, one small spec.

» 17. Recherche Bay, the anchorage, depth 0 — 20 m., stony bottom, 13/VII, one spec.

in 1899:

Tromsö, depth 60—70 m., 22/VI, several spec., WULFF.

This well-known species has a very wide distribution in the North Atlantic and Arctic Oceans. It has been obtained at the following places: in the North Sea off the coasts of England, Denmark and Scandinavia, off Belgium and France, off the Murman coast; in the Barents Sea, in the Kara Sea, off Beeren Island and Spitzbergen, off Iceland and West Greenland as far north as Godhavn, off the coasts of New Foundland and New England as far south as Cape Cod. According to Brandt, it occurs also in the Sea of Ochotsk; but it is still undecided if the specimens recorded by that author are quite identical with the typical North Atlantic species.[1] It also depends on the settlement of this question as to whether we are to regard it as circumpolar or not. Its main distribution seems to be the North Atlantic where it occurs both on the European and the American side, and goes into the Arctic as far north as Spitzbergen and Godhavn, and southwards to Belgium and the Atlantic coasts of France.

It lives in shallow water, although sometimes occurring in depths of 100 fathoms or more.

As to the identity of this and the next species, I refer the reader to STEBBING, Arctic Crustacea, l. c. p. 2—4, where he will find an historical review of the different opinions. I am unable here, for want of material, to enter on a discussion of the subject; but I must content myself with remarking that my specimens of *Hyas coarctatus* from the harbour of Tromsö, some of which were egg-carrying females (although of a remarkably small size) present the typical appearance and are, at the very first glance, to be distinguished from specimens of *Hyas araneus*.

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[1] According to STIMPSON in RATHBUN, l. c. p. 97, not one of *Hyas araneus* out of several hundred specimens of *Hyas latifrons* was found in a collection from the Sea of Ochotsk and *Kamtschatka*.

Length of carapace of largest spec.: 50 mm., breadth 38 mm.

2. **Hyas coarctatus** Leach.

1815. Hyas coarctatus Leach, A tabular view etc., l. c. p. 329.
1853. » » Bell, Hist. Brit. Stalk-eyed Crust. p. 35.
1879. » » Smith, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 43.
1893. » » Rathbun, Catalogue of the Crabs of the Family Maiidæ etc. l. c. p. 69.
1893. » » A. Milne Edwards et Bouvier, Brachyures Anomures, l. c. p. 19.
1897. » coarctata Birula, Essai d'une faune des crustacés décapodes etc., l. c. p. 445.

Localities:

in 1899:

Tromsö depth 60—70 m., 22/VI several spec., Wulff.

Distribution: This species occurs in the same tracts of the ocean as the preceding species, viz. the North Atlantic and Arctic. Therefore, it is superfluous to reiterate the localities where it has been observed. It goes southwards on the European side of the Atlantic to the British Channel, and, on the American side, to the coasts of New Jersey and Long Island. It has not yet been obtained off Spitzbergen or East Greenland. It goes on the west coast of Greenland as far north as Waigat and Hare Island. Stimpson has reported it from the Behring Sea, and Brandt from the Sea of Ochotsk, the latter distinguishing it by the name of »var. *alutacea*». Stimpson subsequently describes a new species, viz. *Hyas latifrons* from the Behring Sea. Smith suspects that he used, for the description of this species, specimens referred by him, a few months previously, to *Hyas coarctatus*.

That species, according to Smith, seems to be distinct from the North Atlantic *Hyas coarctatus*; but Rathbun, who has examined a great number of specimens, takes an opposite view. How far BRANDT's variety *alutacea* ought to be considered a variety or distinct species, is a matter that must be left to a future revision of the whole genus to decide. Another species, viz. *Hyas lyratus* Dana, occurs from the Aleutian Islands and the Pacific coast of North America southwards to Puget Sound. This species seems to be a very distinct one.

Hyas coarctatus occurs in depths from a few (5) up to more than hundred fathoms.

Length of carapace of largest spec. 24 mm.
breadth » » » 16 mm.

Anomura.

Tribe **Pterygura.**

Fam. **Paguridæ.**

Eupagurus BRANDT 1851.

3. **Eupagurus pubescens** (KRÖYER).

1838. Pagurus pubescens KRÖYER, Grønl. Amfip. l. c. p. 314.
1838—39. » » idem, Consp. Crust. Groenl. l. c. p. 251.
1846 (?). » » idem. Voy. en Scand. etc., Pl. II. Fig. 1, a—n.
1851. » (Eupagurus) pubescens BRANDT, Middendorff's Sibir. Reise l. p. c. 111.
1882. » pubescens HOEK, Crust. »Willem Barents» l. c. p. 6.
1897. Eupagurus pubescens BIRULA, Essai d'une faune des crustacés décapodes etc. l. c. p. 437.
1900. » » STEBBING, Arctic. Crust. l. c. p. 5.

Localities:

in 1898:

stat. 3. lat. 74 21′ N., long. 19 15′ E., Beeren Island, depth 20 m., bottom temp. ± 1,5° C., pebbles, Laminariæ and red algæ, 15/VI, one spec.

stat. 5. lat. 75° 49′ N., long. 24° 25′ E., between Beeren Island and Hope Island, depth 80 m., bottom temp. — 1,42° C., rocky bottom, 21/VI, six spec.
» 12. Recherche Bay near to Fox Glacier, West Spitzbergen, depth 90 m., stony bottom, 4/VII, one spec.
» 13. Recherche Bay, off Fox Glacier, depth 75 m., stony bottom with dead shells and soft grayish-blue clay, 5/VII, six spec.
» 16. Recherche Bay, between Reindeer Point and Fox Glacier, depth 90 m., rocky bottom with soft gray-bluish clay, 8/VII, two spec.
» 17. Recherche Bay, the anchorage, depth 0—20 m., stony bottom, 13/VII, three spec.
» 23. lat. 78° 15′ N., long. 13° 55′ E., Ice Fjord, Safe Harbour, depth 50—90 m., soft grayish mud, 23/VII, one spec.
» 38. lat. 79° 47′ N., long. 14° 28′ E., entrance of Liefde Bay, depth 140 m., stony bottom with red algæ, 25/VIII, one spec.
» 39. lat. 79° 43′ N., long. 10° 52′ E., Danish Island, »Virgo's» harbour, depth 25—30 m., gray mud, Laminariæ, 27/VIII, two spec.
» 41. lat. 75° 58′ N., long. 13° 18′ E., 56 miles S. W. of South Cape, Spitzbergen, depth 350 m., bottom temp. + 2,73° C., grayish clay, 1/IX, one spec.

in 1899:

Tromsö, depth 60—70 m., 22/VI, many spec. Wulff.
West Spitzbergen, Green Harbour, depth 110 m., 30/VI, three spec., Wulff.
North Spitzbergen, Danes Gat, depth 20—30 m., 7/VII, one spec. Wulff.

in 1900:

stat. 1. West Spitzbergen, Ice Fjord, Coal Bay depth 50 m., stony bottom with dead shells, 16/VI—20/VI, det. Lönnberg.
» 8. West Spitzbergen, Kings Bay, depth 10—30 m., pebbles and sand with Laminariæ, 29/VI, det. Lönnberg.

This species seems to be subjected to very great variations as to the degree of the pubescense and to the form of the left chelæ which has produced an almost inextricable confusion in the synonymy.[1] As I have examined specimens only from Spitzbergen and Tromsö, which closely agree with the type as figured by Kröyer, I am of course not able here to enter on a critical discussion as to how far *Pagurus Thompsoni Bell*, *Eupagurus Kröyeri* Stimpson,[1] or some species from Alaska recently described by Benedict[2] as new species, *Eupagurus capillatus*, *Eupagurus brandti* or *Eupagurus dalli* are entitled to a specific rank. The distinctions between all these forms seem to me to be of doubtful value, and the whole genus is, certainly very much in need of a thorough revision. I therefore, restrict myself here to what is said by Stebbing in »Arctic Crustacea etc.» l. c. p. 5. and by Doflein in »Dekap. Krebse arkt. Meere», l. c. p. 341.

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[1] To this has also, without doubt, contributed that Kröyer in his descriptions has, by a *lapsus calami*, as to the chelæ written ›dextræ› instead of ›sinistræ›, as Brandt was the first to suspect.

From this uncertainty, it is consequentily very difficult to get an exact information as to the geographical distribution. In its wider sense the species must be regarded as Arctic and circumpolar. It has been obtained at most places in the arctic region as far as I have been able to find out in the literature. It is, however, not recorded as yet from the Siberian Polar Sea, Franz Joseph Land, or the Kara Sea. Nor does it seem to occur on East Greenland, and, as to its occurrence in the Polar Archipelago of North American, we have no information. It has also not been taken in Smith Sound, and this fact, in connection with its non-occurrence in the above mentioned regions seems to indicate that it does not belong to the Polar basin. The most southern places where it has been obtained are as follows: Bohuslän (Sweden), Kattegat, England, New Jersey, in lat. 40° N., long. 73° W., and Puget Sound.[3]

In my collections there are several large specimens, and it seemed to thrive especially in Recherche Bay, West Spitzbergen. I have one specimen before me from that locality, which measures:

length of carapace	25 mm.
» » rigth hand	45 »
» » left »	34 »

The specimens collected by Mr. Wulff in Tromsö are of a much smaller size.

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[1] *Eupagurus trigonocheirus* Stimpson.

[2] Benedict, Thirty-seven new species etc. l. c. p. 8.

[3] Its vertical distribution is from several fathoms up to 100 or more. In regard to two finds of this in 140 and 290 fathoms resp. Hansen is somewhat dubious as to the exactness of these depths.

Length of largest specimen from this locality:
» » carapace . . . . 16 mm.
» » rigth hand . . . . . . 35 »
» » left » . . . . . . 20 »

Anapagurus HENDERSON 1886.

4. **Anapagurus lævis** (THOMPSON).

1843. Pagurus lævis THOMPSON, Report on the fauna of Ireland, Invertebrate; Rep. Brit. Assoc. Adv. Sci. 13:th meeting.
1853. » » BELL, Hist. Brit. Stalk-eyed Crust. p. 184.
1894. Anapagurus lævis, A. MILNE-EDWARDS et BOUVIER, Brachyures et Anomures, l. c. p. 72, Pl. XI, Figg. 16—28.

Locality:

in 1899:

stat. 1. lat. 61° 16′ N, 1° 18′ E., depth 150 m., sand, some stones and dead shells. 31/V, two spec.

This species was first described by THOMPSON as *Pagurus lævis*, but it was in 1886 referred by HENDERSON to the genus *Anapagurus*, mainly characterized by the form of the male appendix on the fifth left leg, it being here short and curved, instead of spirally twisted, as in *Spiropagurus* STIMPSON. Besides this species, easily distinguishable by a red mark running along the whole length of the hand and continuing to the fingers, HENDERSON includes in this genus four other species from the North Sea, the Tropical part of North Atlantic, and Australia.

Distribution: West Coast of Norway, British Isles, Mediterranean, six stations of the campagnes of 1886 and 1887 (Prince of Monaco), Azores (Prince of Monaco). It is a Pagurid which seems to live in a moderate depth varying between 100 and 200 m.

Length of carapace (of a male) . . . . . 9 mm.
» » right hand . . . . 15 »
» » left . . . . 7 »

Macrura.

Fam. Crangonidæ.

Sclerocrangon SARS 1882.

In his »Oversigt af Norges Crustaceer med foreløbige Bemærkninger over de nye eller mindre bekjendte Arter l. c. 1882 SARS instituted a new genus to receive this Arctic species *Crangon boreas* known more than a century ago. He afterwards gave, in the Norwegian North Atlantic Expedition, a generic diagnosis. In the genus he also included a new species obtained during the said expedition, and with some hesitation, *Crangon cataphractus* Olivi, from the Mediterranean. Later on, he added to the genus *Cheraphilus Agassizii* SMITH, from the Eastern coast of United States, and, in 1895, it was enlarged by ORTMANN[1] with the following species: *Crangon atrox* Faxon,[2] from Western coast of Mexico, *Crangon sharpi* n. sp. from Alaska, *Crangon procax* Faxon, from Western coast of Central America, *Crangon intermedius* STIMPSON, from Bering Sea and Alaska, *Crangon angusticauda* de HAAN, from Japan, *Crangon munitus* DANA, from Puget Sound and Lower California.[3] Besides the true *Crangon salebrosus* OWEN, the genus *Sclerocrangon* would thus include no less than eleven species, seven of which belonging to the North Pacific, three to the North Atlantic, and one to the Mediterranean.

5. **Sclerocrangon boreas** (PHIPPS).

1774.	Cancer Boreas	PHIPPS, Voyage towards the North Pole, p. 190, Tab. XII, Fig. 1.
1842—43.	Crangon »	KRÖYER, De hidtil bekj. nord. Krangon-Art. l. c. p. 218, Tab. IV, Fig. 1—14.

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[1] It may be remarked that this author regards it as a subgenus of *Crangon*.

[2] *Faxon*, Prelim. Descript. New Spec. Crust. l. c. p. 199.

[3] ORTMANN, Study Syst. Geogr. Distrib. Crangonidæ l. c. p. 177.

1874. Crangon boreas Buchholz, Crust. Zweite Deutsche Nordpolarfahrt, l. c. p. 271.
1882. Cheraphilus boreas Hoek, Crust. »Willem Barents» l. c. p. 10.
1886. Sclerocrangon » Koelbel, Crust. Pycnog. und Arachn. von Jan Mayen, l. c. p. 51.
1897. » » Birula, Essai d'une faune des crustacés décapodes etc., l. c. p. 431. Tab. XX. Fig. 8.

Localities:

in 1898:

stat. 13. West Spitsbergen, Recherche Bay, off Fox Glacier, depth 75 m., stony bottom with dead shells and soft grayish-blue clay, 5/VII, four spec.
» 16. Recherche Bay, between Reindeer Point and Fox Glacier, depth 90 m., rocky bottom with soft grayish-blue clay, 8/VII, four spec.
» 17. Recherche Bay, the anchorage, depth 0—20 m., stony bottom, 13/VII, numerous spec.
» 20. West Spitzbergen, Ice Fiord, North Fiord, off Cape Wærn, depth 36 m., boulders, Lithothamnia, with soft red-brownish clay, 19/VII, two spec.
» 22. lat. 78° 22′ N., long. 14° 53′ E., Ice Fiord, off Cape Boheman, depth 40—50 m., 21/VII, four spec.
» 30. King Charles' Land, Swedish Foreland, depth 10—16 m., blackish-gray sand, stones, mud, and algæ. 6/VIII, four spec.
» 38. lat. 79° 47′ N., long. 14° 28′ E., entrance of Liefde Bay, depth 140 m., stony bottom with red algæ, 25/VIII, five spec.
» 39. lat. 79° 43′ N., long. 10° 52′ E., Danes Island, Virgo's harbour, depth 25—30 m., gray mud, Laminariæ, 27/VIII, several spec.

in 1899:

stat. 21. lat. 74° 10′ N., long. 20° 8′ W., S. E. of Clavering Island, depth 25—40 m., mud with dead shells and pebbles, 17/VII, one spec.

West Spitzbergen, Green Harbour, depth 110 m., 30/VI, five spec., Wulff.

North Spitzbergen, Danes Gat depth 20—30 m., 7/VII, several spec. Wulff.

North Spitzbergen, Treurenberg Bay, depth 10—20 m., 10/VIII, four spec., Wulff.

in 1900:

stat. 1. West Spitzbergen, Ice Fiord, Coal Bay, depth 50 m., stony bottom with dead shells. 16/VI—20/VI, det. Lönnberg.
» 2. ibidem, depth 100 m., rocks, 16/VI—20/VI, det. Lönnberg.
» 3. ibidem, depth 50—100 m., stones, 22/VI, det. Lönnberg.

stat. 11. lat. 79° 20′ N., long. 10° E., W. of Spitzbergen, depth 100 m., stones, 5/VII, det. LÖNNBERG.
» 12. ibidem, depth 60 m., rocks, 5/VII, det. LÖNNBERG.

This species is one of the most common decapods in the Arctic Ocean, where it lives mainly in shallow water from a few up to 100 fathoms. In greater depths it very seldom occurs, although, in HANSEN'S catalogue of West Greenlandian Malacostraca, it is said once to have been obtained off Jakobshavn, at a depth af 200 fathoms. The author, however, points out, that he has never seen a single specimen from the numerous Swedish dredgings from a depth of 100—400 fathoms — which seems to prove that the species, at least as a rule, does not live in depths even slightly exceeding 100 fathoms.

Its horizontal distribution is very extensive within the Arctic Circle. I content myself with remarking that it has been recorded from almost every coast. On the Eastern coast of North America it goes as far south as Massachusetts Bay and right along the coast of Norway to Lofoten Island.

As to the strange fact that it has not as yet been obtained in the Kara Sea either by the Danish »Dijmphna» Expedition or by the Swedish expeditions, and that it seems to be very rare E. of Spitzbergen and off East Greenland, I refer to what is said farther on under the next species. Although BRANDT[1] says that »das Museum besitzt = = = mehrere vom Hrn v. BAER im Eismeere gesammelte Individuen = =», it is somewhat surprising to find that STUXBERG does not mention it as occurring along the Siberian coast except very far east. HANSEN remarks also that these statements as well as STIMPSON'S notice that it occurs »along the whole coast of North America to Bering Straits» must be — *ad interim* — considered as somewhat doubtful, because, possibly, some confusion with *Sclerocrangon salebrosus* taken at Kamtschatka may exist as to some of these dates. I, therefore, think that its generally accepted circumpolarity must be proved by further investigation in the Siberian Polar Sea, as well as in the North American Archipelago.

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[1] MIDDENDORFF'S Sibir. Reise l. c. p. 114.

Length of greatest spec. (from stat. 38, 1898) 90 mm.

Sclerocrangon boreas is sometimes very much infested by an ectoparasitic *Piscicolid.*

Sclerocrangon ferox (G. O. SARS).

1877. Cheraphilus ferox G. O. SARS, Prodromus descriptionis etc., l. c. p. 339.
1882. » » HOEK, Crust. »Willem Barents», l. c. p. 9, Taf. I, Fig. 3.
1885. Sclerocrangon salebrosus G. O. SARS, Norske Nordhavsexp. I, p. 15, pl. 2.
1886. » » KOELBEL, Crust. Pycnog. und Arachn. JAN MAYEN, l. c. p. 51, taf. IV, fig. 1—12.
1887. » ferox HANSEN, Dijmphna-Togtet zool. bot. Udbytte, p. 236.
1897. » » BIRULA, Essai d'une faune des crustacés décapodes etc., l. c. p. 432, Tab. XX, Fig. 9.
1900. » » STEBBING, Arctic Crust. l. c. p. 7.
1900. Crangon (Sclerocrangon) salebrosus DOFLEIN, Dekap. Krebse arkt. Meere, l. c. p. 323.

Localities:

in 1898:

stat. 7. lat. 77° 25′ N., long. 27° 30′ E., N. of Hope Island, depth 160 m., bottom temp. — 1,71° C., yellowish-brown clay, 23/VI, four spec.

» 37. lat. 81° 14′ N., long. 22° 50′ E., N.E. of Seven Islands, depth 150 m., bottom temp. + 2° C., gray clay, 20/VIII, five spec.

» 40. lat. 79° 58′ N., long. 9° 30′ E., 19—20 miles N.W. of Danes Island, depth 435 m., bottom temp. + 1,5° C., gray clay, stones, 27/VIII, one spec.

in 1899:

stat. 2. lat. 62° 15′ N., long. 0° 37′ E., depth 670 m., mud with pebbles, 1/VI, one spec.

Off Kaiser Franz Joseph Fiord, in the oseophagus of *Phoca barbata.* 22/VII, one spec.

stat. 27. lat. 71° 35′ N., long. 21° 10′ W., depth 260 m., stones, and mud, 27/VII, one spec.

» 37. lat. 73° 2′ N., long. 24° 30′ W., King Oscar Fiord, depth 180 —215 m., mud, much pebbles and stones, one spec.

» 43. lat. 73° 32′ N., long. 24° 38′ W., Kaiser Franz Joseph Fiord, Cape Weber, depth 100—119 m., mud with pebbles and stones, 28/VIII, one spec.

in 1900:

stat. 16. lat. 72° 25′ N., long. 17° 56′ W., E. of Greenland, depth 300 m., pebbles and sand, 30/VII, det. LÖNNBERG

» 25. the entrance of Kaiser Franz Joseph Fiord, depth 200—300 m., mud, 14/VIII, det. LÖNNBERG.

» 27. Kaiser Franz Joseph Fiord, Muskox Fiord, depth 220 m., clay, 21/VIII, det. LÖNNBERG.

This magnificent species was first described by SARS in 1877 as *Cheraphilus ferox* and, a few years later, under the same name by HOEK. Then, a full description was given by SARS in the Crustacea of the Norwegian North Atlantic Expedition, but, unfortunately, he identified it with *Crangon salebrosus* OWEN described in BEECHEY's Voyage. HANSEN, in his »Oversigt over de paa Dijmphna-Togtet indsamlede Krebsdyr», has, however, with full evidence shown that OWENS *Crangon salebrosus* is quite another species. Both in regard to the form of the rostrum and the sculpture of the carapace, it exhibits no resemblance at all.[1] As far as I know, ORTMANN and DOFLEIN are the only ones amongst subsequent writers who have not accepted HANSEN's alteration of the nomenclature; but, as to the last author, it is not surprising at all, as he did not use either »Malacostraca marina Groenlandiæ occidentalis» or the work cited a few lines above, next KRÖYER's and SARS' works undoubtedly the most important ones with regard to Arctic crustaceans. He contents himself in »Zusätze und Berichtigungen» to cite their titles.

The species has been taken at several stations in the Arctic Ocean. It was obtained, during the Norwegian North Atlantic Expedition, at six stations, four of which were situated in the sea round Spitzbergen, one off JAN MAYEN, and one off the West coast of Norway. On the cruises of »Willem Barents» it was found at five stations in Barents Sea.

It was dredged in the Kara Sea at two stations during NORDENSKIÖLDS voyages, and at no less than twenty on the »Dijmpha Expedition. KOELBEL enumerates it from JAN MAYEN, and HANSEN from four places off West Greenland. It is mentioned by BIRULA from the Murman Coast, and by STEBBING from three stations in Barents Sea. One specimens was obtained by the »Helgoland» Expedition »in der Nansenrinne» in lat. 81° 20′ N., long. 19° E., and another one by »Olga» between South Spitzbergen and Hope Island. Besides the stations enumerated above, where it was dredged during the last three Swedish Arctic Expeditions, these are, as far as I have been able to find in the literature, the only certain localities hitherto recorded of its distribution. STUXBERG states that it does not occur E. of the Kara Sea, and the finds of it off Kamtschatka and in the Bering Straits are already shown to have arisen from some confusion with *Crangon salebrosus* OWEN.

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[1] In 1890 SARS himself corrected his error in naming it *Sclerocrangon ferox*.

It is worth while remarking its singular distribution in the Spitzbergian and Greenlandian Seas. It has not as yet been obtained on the West Spitzbergen, but it seems to be rather abundant farther east, in the Barents and Kara Seas.; while in these seas, *Sclerocrangon boreas*, which is so abundant off West Spitzbergen, becomes rather scarce here. The same we might state with regard to East Greenland. Although BUCHHOLZ says that *Sclerocrangon boreas* »gehört daselbst ebenfalls zu den sehr häufig vorkommenden Formen», it must be pointed out that, during the Swedish Expeditions of 1899 and 1900, this species was only dredged at one station, and was represented by a single specimen, while *Sclerocrangon ferox* was obtained at no less than seven stations in several specimens. Moreover, *Sclerocrangon boreas* is by far, next to *Hippolyte polaris*, perhaps the most common decapod on both sides off Baffin Bay, as HANSEN and I myself can testify; while the other species, as mentioned above, have been hitherto obtained in those seas only at four stations and in a small number of individuals.

Thus it seems as if they do not like living together, but substitute each other. It has often been remarked that *Sclerocrangon boreas* lives in more shallow water, while *Sclerocrangon ferox* is an inhabitant of the deep-sea, and that theory may partly hold good. Nevertheless, it does not fully explain its singular distribution; for, in the shallow seas E. of Spitzbergen, *Sclerocrangon ferox* is very common, and, on the other hand, *Sclerocrangon boreas* has been taken at a depth of 200 fathoms.

I think, therefore, that we must look for the explanation in the temperature of the water. As a rule the bottom temperature of the water in the seas E. of Spitzbergen and of East Greenland is more or less about zero, varying somewhat from + 2° C., to — 1,5° C. and the same, I think, will be proved to be the case off East Greenland, when the hydrographical observations made during the Swedish Expeditions have been summarized. This temperature corresponds, on the whole, very well with those in the greater depths of the ocean. Only in water of that temperature *Sclerocrangon ferox* has been found, while the type species seems to live in water of somewhat higher temperature. I fully admit, however, that this does not afford a quite satisfactory explanation, for it will be difficult to account for that in Smith Sound, for instance, where a strong Arctic current runs southwards, *Sclerocrangon boreas* is rather abundant, while the other one is wanting.

The greatest depth from which this species has been dredged is, I believe, 1000 m. (station north of Spitzbergen, Helgoland Expedition).

Sclerocrangon ferox rivals preceding species also in regard to size.

Length of the greatest spec. (from stat. 37, 1899) 121 mm.

Crangon Fabricius 1798.

7. **Crangon Allmanni** Kinahan.

?	Crangon	Allmanni Kinahan, Proc. Nat. Hist. Soc., Dublin, Vol. II (cited after Kinahan).
1862.	„	(Steiracrangon) Allmanni idem, On the Brit. Spec. of Crangon and Galathea etc., l. c. p. 65, pl. III.
1890.	„	Allmanni G. O. Sars, Decapodernes Forvandlinger, l. c. p. 135, tab I, fig. 29—31.
1897.	„	Allmanni Birula, Essai d'une faune des crustacés décapodes etc., l. c. p. 430, tab. XX, fig. 5.
1900.	„	allmanni Doflein, Dekap. Krebse arkt. Meere, l. c. p. 326.

Locality:

in 1899.

stat. 1. lat. 61° 16′ N,. long. 1° 18′ E., depth 150 m., sand, some stones and dead shells, 31/V, seven spec.

This form, which is easily distinguishable by the groove on the sixth segment of pleon, was first described by KINAHAN as a distinct species. It has proved impossible for me to get the first paper in which it is named by that author, so that I am, consequently, not able to give an exact reference here. I must, therefore, quote it after KINAHANS later and, as I believe, more extensive memoir »On the Britannic Species of Crangon and Galathea; with some Remarks on the Homologies of these Groups».

There have been many disputes as to the specific value of this form, and, in fact, the difference between it and the common *Crangon vulgaris* (LINNÉ) does not seem to be very great. But since SARS has published his remarkable observations on the development of these species, we cannot any longer have any doubts as to their specific difference. The great carcinologist traced the development of both species which is, on the whole, more or less the same. He could, however, very easily distinguish the species on whatever stage by two very striking characteristics. In the larvas of *Crangon vulgaris* the third segment of the pleon is provided with a strong dorsal spine directed at the rear which is quite wanting in those of *Crangon Allmanni*. Besides that the lateral spines on the fifth segment of pleon in the former species are comparatively much larger than those in *Cr. Allmanni* the larvas of which are, on the whole, larger and more slender than those of *Cr. vulgaris*.

This species seems to belong to the European side of the North Atlantic. It was observed for the first time by KINAHAN at Dublin whence he established the species in 1850. Later on, it has been obtained at several places in the North Sea, Skagerack, Kattegat, and the Sound, along the coast of Norway where it occurs not infrequently as far east as to the Murman Coast and the entrance to the White Sea. During the Norwegian North Atlantic Expedition it was also taken in the harbour of Reykiavik, Iceland. It lives in moderate depths, 20—30 fathoms. METZGER obtained it once from 69 fathoms,[1] and my specimens were dredged from 150 m. which, I think, are the greatest depths hitherto recorded for its vertical range. It prefers, for the most part, to live in the sand or »Schlick».

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[1] l. c. p. 290.

Length of largest spec. (a female with roe) 51 mm.

The eggs are very small and numerous.

Cheraphilus Kinahan 1862.

8. **Cheraphilus echinulatus** (M. Sars).

1862. Crangon echinulatus M. Sars, Bemærkn. over Crangoninerne. l. c. p. 186.
1868. » » idem, Bidrag till Kundskab etc., l. c. p. 269, Tab. III, Figg. 48—64.
1882. Cheraphilus echinulatus G. O. Sars, Overs. Norges Crustaceer etc., l. c. p. 44.
1890. » » G. O. Sars, Dekapodernes Forvandlinger, III. l. c. p. 147, pl. II, fig. 1—21.

Locality:

in 1899:

stat. 1. lat. 61° 16′ N., long. 1° 18′ E., depth 150 m., sand, some stones and dead shells, 31/V, one spec.

This species belongs, according to Sars, to Kinahans genus *Cheraphilus* s. str. Two other Norwegian species are included by the same author in this genus, viz. *Cheraphilus nanus* (Kröyer) and *Cheraphilus neglectus* (G. O. Sars). None of these is represented in the collections of the last Swedish Arctic Expeditions.

Cheraphilus echinulatus, with which, according to Sars, *Crangon serratus* Norman is identical, has hitherto been obtained only in the North Sea, off the Western and Southern coasts of Norway and off the coasts of Scotland. It seems to be very rare, and it lives at considerable depths, 50—70 fathoms or more.

Length 27 mm. According to M. Sars, the largest females attain a length of 37 mm.

Pontophilus Leach 1817.

Pontophilus norvegicus M. Sars.

1861. Crangon norvegicus M. Sars, Beretn. om en i 1859 foretagen zool. Reise etc., l. c. p. 248.

1862.	Pontophilus norvegicus	M. Sars, Bemærkn. over Crangoninerne etc., l. c. p. 183.
1864.	Crangon (Pontophilus)	norvegicus Goës, Crust. decap. mar. Sueciæ., l. c. p. 173.
1868.	Pontophilus norvegicus	idem, Bidrag til Kundskab etc., l. c. p. 242, Tab. I, Figg. 1—25, Tab. II, Fig. 17—37.
1869.	» »	G. O. Sars, Undersög. over Christianiafjordens Dybvandsfauna, l. c. p. 321.
1890.	» »	G. O. Sars, Dekapodernas Forvandlinger, III, l. c. p. 153, pl. IV.

Localities:

1898:

stat. 41. lat. 75° 58′ N., long. 13° 18′ E., 56 miles S.W. of South Cape, Spitzbergen, depth 350 m., bottom temp. + 2,73° C., grayish clay, 1/IX, one spec.

» 42. lat. 73° 3′ N., long. 18° 30′ E., between Beeren Island and Norway, depth 410 m., bottom temp. + 2° C., gray clay, 4/IX, five spec.

This species was first shortly described by M. Sars in 1861 on specimens from some places of the Western and Southern fjords of Norway and, seven years later, fully redescribed by him and figured by his son. Nothing new is of course to be added to Michael Sars' concise and accurate description.

In its geographical distribution this species seems to be confined to the North Atlantic. It not in frequently occurs in the deepest hollows of the Norwegian fjords, as Christiania Fiord, Sogne Fiord, West Fiord, Porsanger Fiord and Tana Fiord. During the Norwegian North Atlantic Expedition it was also obtained at four other stations more or less far out at sea; two of which are situated off the West coast of Norway, and the others between Finmarken and Beeren Island. It also occurs, according to Goës, at »Skårberget», the deepest place (80—90 fathoms) in Gullmar Fiord, Bohuslän. But on the other side of the North Atlantic it has also been recorded, although it seems here to be still more rare than on the European. Thus Hansen enumerates it in his catalogue of *Malacostraca* from West Greenland from lat. 65° 35′ N., long. 54° 50′ W. depth 80 fathoms, and another specimen from

»Greenland». By SMITH[1] it has been mentioned as occurring in the Gulf of Maine, off the coast of Nova Scotia, and at two more stations off the Atlantic coast of United States, in depths ranging from 101 to 524 fathoms. The greatest depth at which it has been dredged, was 672 fathoms (= 1229 m.), in the inner part of Sogne Fiord.

Although, at present, occurring but very rarely within the Arctic Ocean, the species is, in all probability, of an Arctic origin. Like *Munnopsis typica*, *Calathura brachiata* and others, it dwells now, since the great fiords of Norway have been partly obstructed from free communication with the open sea by submarine ridges, only in the very deepest hollows of the fiords, where the conditions are most analogous with those of the Arctic Ocean.

Length of greatest spec. (a female with roe from stat. 41.) 64 mm.

The eggs are, contrary to what might have been anticipated in such a deep-sea form, small and numerous, although relatively larger than in *Crangon Allmanni*. The cleavage was just finished, but no formation of embryo was yet to be observed, all eggs being about the same stage.

10. **Pontophilus spinosus** (LEACH.)

1815.	Crangon spinosus	LEACH, A tabular View etc., l. c. p. 146.
1853.	» »	BELL, Hist. Brit. Stalk-eyed Crust., p. 261.
1862.	Cheraphilus »	KINAHAN, On the Brit. Spec. of Crangon and Galathea etc., l. c. p. 74, Pl. VII.
1862.	Pontophilus spinosus	M. SARS, Bemærkn. over Crangoninerne etc., l. c. p. 185.
1863.	Crangon spinosus	HELLER, Crust. Südl. Europa, P. 229, Taf. VII, Fig. 16,
1868.	Pontophilus spinosus	M. SARS, Bidrag til kundskab etc., l. c. p. 264, Tab. II, Figg. 38—45, Tab. III, Figg. 46, 47.
1890.	» »	G. O. SARS, Dekapodernas Forvandlinger, III, l. c. p. 153, pl. III.

Locality:

in 1899:

stat. 1. lat. 61° 16′ N., long. 1° 18′ E., depth 150 m., sand, some stones and dead shells, 31/V, three spec.

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[1] SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 61, and, idem, Decapoda, l. c. p. 34.

This form from which the former must be regarded as a distinct species,[1] since G. O. SARS has made his important discoveries with regard to the development of *Crangonidæ* was first obtained off the coasts of England and Ireland. Later on, M. SARS, BOECK, and DANIELSSEN dredged it at several places on the Southern and Western coasts of Norway as far north as Christiansund, in lat. 62 35′ N., but everywhere its occurrence was very rare. It lives mainly in moderate depths ranging from 30—60 fathoms. GOËS enumerates it amongst Decapoda from Bohuslän. It has also been found in the Mediterranean, in Adria. This fact, together with its occurrence in shallower water, point to its more Southern origin, as opposed to that of the preceding species.

Length of greatest spec. 31 mm. The largest specimens which M. SARS measured reached a length of 43 mm.

Nectocrangon BRANDT 1851.

Syn. **Argis** KRÖYER 1842—43.

11. **Nectocrangon lar** (OWEN).

1839. Crangon lar OWEN, Zoology of Captain BEECHEY'S Voyage, p. 88, pl. XXVIII, Fig. 1.
1842—43 Argis lar KRÖYER, De hidtil bekj. nord. Krangon-Art., l. c. p. 255. Tab. V. Figg. 45—62.

Localities:

in 1899:

stat: 39. lat. 72 45′ N., long. 22 58′ W., depth 35—60 m., light yellowish-brown clay, one spec.

in 1900:

stat. 27. Kaiser Franz Joseph Fiord, Muskox Fiord, depth 220 m., clay, 21/VIII, one spec., mutilated det. LÖNNBERG.

This species, first described by OWEN, was made the type of a new genus by KRÖYER, but as that name *Argis* had unfortunately, been used before, it had to be dropped to make room for *Nectocrangon* BRANDT 1851. Another species, *Nectocrangon alaskensis*, was described by KINGSLEY, in 1882, from Alaska.

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[1] GOËS considered both species as identical, l. c. p. 173.

Distribution: Nectocrangon lar has a rather restricted range within the Arctic Ocean. It has been obtained in the Behring Sea, off Alaska, »Arctic Ocean» (OWEN), Smith Sound, Baffin Bay, Davis Strait, Labrador, New Foundland, Nova Scotia, East Greenland. But from this coast, where it seems to be rare, only five specimens having been previously recorded (HANSEN), as far as the Behring Sea, no specimen has hitherto occurred within the whole of this large area.

It is found mostly on muddy bottom, so that KRÖYER first called it by the specific name *argilicola* which, however, must yield priority to the less appropiate *lar*. It ranges vertically from a few to 120 fathoms.

Length 95 mm. (st. 39. 1899).

Sabinea KRÖYER 1842—43.

12. **Sabinea septemcarinata** (SABINE).

1827. Crangon septemcarinatus SABINE, Supplement to the Appendix to Capt. Parry's Voyage 1819—1820, p. CCXXXVI, Pl. II, Figs. 11—13.

1842—43. Sabinea (Crangon) septemcarinata KRÖYER, De hidtil bekj. nord. Krangon-Art., l. c. p. 244. Tab. IV, Figs. 34—40, Tab. V, Figs. 41—44.

1846. (?) Myto Gaimardii idem, Voy. en Scand. etc., l. c. pl. 7, fig. 1 a—q. (young stage).

1879. Sabina septemcarinata SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 57. Pl. XI, Figs. 5, 9—13.

1882. » » HOEK, Crust. »Willem Barents», l. c. p. 12.

1887. » » HANSEN, Dijmphna-togtets zool. bot. Udbytte, p. 237.

1890. » » G. O. SARS, Decapodernas Forvandlinger, III, l. c. p. 168, pl. V, pl. VI, fig. E 1—13.

1897. » » BIRULA, Essai d'une faune des crustacés décapodes etc., l. c. p. 431, tab. XX, figs. 6, 6 a, 6 b.

1900. » » STEBBING, Arctic Crustacea, l. c. p. 6.

Localities:

in 1898:

stat. 7. lat. 77° 25′ N., long. 27° 30′ E., N. of Hope Island, depth 160 m., bottom temp. — 1,71° C., brownish-yellow clay, 23/VI, two spec.

stat. 8. lat. 76° 50′ N., long. 17° 20′ E., Stor Fiord, depth 14—18 m., stony bottom with Laminariæ, 25/VI, one spec.

» 12. Recherche Bay, near to Fox Glacier, West Spitzbergen, depth 90 m., stony bottom 4/VII, three spec.

» 13. Recherche Bay, off Fox Glacier, depth 75 m., stony bottom with dead shells and soft bluish-gray clay 5/VII, three spec.

» 17. Recherche Bay, the anchorage, depth 0—20 m., stony bottom, 13/VII, five spec.

» 30. King Charles Island, Swedish Foreland, depth 10—16 m., grayish-black sand, stones, mud and algæ, 6/VIII, one spec.

» 32. King Charles Island, Rivalen Sound, depth 100—110 m., bottom temp. —1,45° C., soft clay with boulders, 8/VIII, eight spec.

» 34. lat. 78° 50′ N., long. 29° 39′ E., King Charles Island, depth 60—70 m., soft, grayish-black clay, 17/VIII, one spec.

» 35. lat. 80° 15′ N., long. 33° 10′ E., White Island (New Island), depth 40—50 m., rocky bottom, 18/VIII, seven spec.

» 37. lat. 81° 14′ N., long. 22° 50′ E., depth 150 m., grey mud, eight spec.

» 38. lat. 79° 47′ N., long. 14° 28′ E., entrance of Liefde Bay, depth 140 m., stony bottom with red algæ, 25/VIII, two spec.

in 1899:

stat. 29. lat. 70° 27′ N., long. 22° 35′ W., Scoresby Sound, Cape Stewart, depth 13—18 m., mud, boulders, algæ, 30/VII, one spec.

» 39. lat. 72° 45′ N., long. 22° 56′ W., depth 35—60 m., mud and stones, 18/VIII, two spec.

» 40. lat. 72° 1′ N., long. 23° 3′ W., depth 32—40 m., mud, 20/VIII, two spec.

» 43. lat. 73° 32′ N., long. 24° 38′ W., Kaiser Franz Joseph Fiord, Cape Weber, depth 100—110 m., mud with pebbles and stones, 28/VIII, one spec.

in 1900:

stat. 3. Ice Fiord, Coal Bay, West Spitzbergen, depth 50—100 m., stones, 22/VI, det. LÖNNBERG.

» 16. lat. 72° 25′ N., long. 17° 56′ W., E. of Greenland, depth 300 m., pebbles and sand, 30/VII, det. LÖNNBERG.

» 17. East Greenland, Mackenzie Bay N. of Kaiser Franz Joseph Fiord, depth 12—35 m., mud, 1/VIII—3/VIII, det. LÖNNBERG.

» 19. lat. 74° 35′ N., long. 18° 15′ W., S.E. of Pendulum Island, depth 150 m., mud and stones, 5/VIII, det. LÖNNBERG.

stat. 22. East Greenland, Mackenzie Bay N. of Kaiser Franz Joseph Fiord, depth 12—18 m., mud, 9/VIII, det. LÖNNBERG.

Sabinea was founded in 1842 by KRÖYER to receive SABINE's *Crangon septemcarinata.* Later on SMITH drew the attention to the fact that two forms had been confounded under that name, the chief differences being the form of the rostrum and telson and the more pronounced armament of the longitudinal *cristæ* on the carapace. Still, there exist some doubts, if *Sabinea Sarsii* may be entitled to specific value. SPENCE BATE, in his Challenger Report on the Macrura,[1] describes and figures as *Sabinea septemcarinata* specimens taken off Nova Scotia which undoubtedly belong to *Sabinea Sarsii.* Later on, ORTMANN and DOFLEIN consider them as identical, without giving any reasons for this view. DOFLEIN despatches the whole matter with the following passage:[2] »Ich halte *septemcarinata* und *sarsi* für identisch oder höchstens für Varietäten derselben Art. Mein Material zeigt bedeutende Schwankungen in den von SMITH angegebenen Merkmalen.» It is only to be regretted that the author of that work did not deal with any details in favour of this argument, whereby he might at least have thrown some fresh light on our knowledge of Arctic Decapoda.

When examining my material of *Sabinea* I found that all specimens agree exactly with the description given by KRÖYER and SMITH. The form of the rostrum, and that of the telson and its armament with spines, closely resemble that of *Sabinea septemcarinata.* The only deviating point applies to the number of spines of the median dorsal *crista.* In a number of individuals of smaller size, up to 40 mm. length, there are nearly regularly six spines, instead af five as SMITH has observed in his specimens, and, besides that, the spines of the *cristæ* are also more prominent than in the older ones; but that, however, may be accounted for by the age, as we may notice the same fact in *Sclerocrangon.* Only in one old female of 72 mm. length I found *six small* spines in the median dorsal *crista*, but, in all other fullgrown specimens, there was the regular number of *five small* ones, and in no single specimen out of all that I have examined, have I found the form of telson and rostrum as in *Sabinea Sarsii* as figured by SMITH, SPENCE BATE, and BIRULA. Thus, I consider like SMITH, SARS, HANSEN, STEBBING, BIRULA and others *Sabinea septemcarinata* and *Sabinea Sarsi* as »good species».

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[1] l. c. p. 498, pl. LXXXIX, fig. 2, pl. XC, fig. 1.
[2] l. c. p. 328.

Even if one had some hesitation with regard to this, every doubt must disappear after the important discoveries that SARS has published about the metamorphosis of the *Crangonidæ*. In the paper cited above he figures[1] the telson of very small individuals of both species, and even in these young stages, the difference between both is still more striking than in older ones.

Distribution: This is one of the most common decapods in the Arctic Ocean. It has been obtained off nearly every coast. Thus, I enumerate the following places: Western and Northern coasts of Norway, Spitsbergen, Barents Sea, White Sea, Nova Semla, Siberian Polar Sea, Smith Sound, Baffin Bay, Davis Strait, Nova Scotia, New England, East Greenland, Iceland. Thus it is to be considered as Arctic and circumpolar. *Sabinea Sarsii* is occurring off North Eastern coast of U. States, off Nova Scotia, off South Western coast of Greenland, where *Sabinea septemcarinata* is also rather scarce (HANSEN), off Western coast of Norway up to the Lofoten Islands.

The vertical range of *Sabinea septemcarinata* extends from a few up to 300 meters; that of *Sabinea Sarsii* seems to be more or less the same.

DOFLEIN[2] suggests that *Sabinea septemcarinata* is an inhabitant of muddy bottom. In this I cannot agree with him; both my own experience and the statements of others fail to confirm that. In the list of localities one will find rocks, gravel, sand, and algæ as common as mud.

Length of greatest spec., a female, from stat. 39 in 1899
81 mm.

Nearly all full-grown females were carrying eggs.

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[1] l. c. p. 180, tab. XV, figs. 24, 25.
[2] l. c. p. 328.

Fam. Alpheidæ.

Bythocaris G. O. Sars.

13. **Bythocaris simplicirostris** G. O. Sars.

Fig. 1.

1870.	Bythocaris simplicirostris	G. O. SARS, Nye Dybvandscrust. fra Lofoten, l. c. p. 149.
1886.	» »	G. O. SARS, Norw. North Atl. Exp., II, p. 7.
1897.	» »	BIRULA, Essai d'une faune des crustacés décapodes etc., l. c. p. 427, tab. XX, fig. 3.

Locality:

in 1900:

stat. 21. East Greenland, off Kaiser Franz Joseph Fiord, between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, one spec.

Of this species, upon which G. O. Sars based his genus *Bythocaris*, mainly distinguished from *Hippolyte* by the structure of the mandibles, I found a single female amongst a number of *Bythocaris Payeri*. In all essential details it closely agrees with Sars' description. Thus the dorsal *carina* is provided with two small spines, the hindmost of which is, however, very minute and almost blunt. The third segment of pleon has a median dorsal hook. Telson, as in *Bythocaris leucopis*, with four minute spinules on either side. The basal joint of the peduncle of antennæ has a spine on the inner margin. The scales of the antenna rather remind us of that in *Bythocaris Payeri* than of that in *Bythocaris leucopis*. Mandibles, maxilla, and maxillipeds, as in last species. Last joint of third pair of maxillipeds with 8—9 spinules. Fifth joint of second pair of pereiopods divided into 10 articulations.

The specimen was an egg-carrying female; the eggs, as is usual in the genus, being of large size and few in number.

This species, which is easily recognizable from its nearest allied species, by the form of the rostrum was observed for the first time by G. O. SARS at a place off the Norwegian coast at a depth of 250 fathoms. Later on, two mutilated specimens were taken during the Norwegian North Atlantic Expedition between Beeren Eiland and Finmark, and W. of Spitzbergen, in depths of resp. 191 and 416 fathoms. BIRULA mentions it in his memoir on *Decapoda* from the White Sea and the Murman Coast. It seems everywhere to be very scarce.

Length 42 mm.

14. **Bythocaris leucopis** G. O. SARS.

1879.	Bythocaris leucopis	G. O. SARS, Crust. et Pycnog. nova etc., l. c. p. 427.
1885.	» »	G. O. SARS, Norske Nordhavsexp., I. p. 27, pl. III, figs. 1—26.

Localities:

in 1898:

stat. 27. lat. 77° 52′ N., long. 3° 5′ W., 40′ of S.W. of »the Swedish Depth», depth 2750 m., bottom temp. — 1,4° C. Biloculina clay, 29/VII, several spec.

» 28. lat. 76° 36′ N., long. 12° 10′ E., 50′ W. of Horn Sound, depth 1750 m., bottom temp. — 1,3° C., transition clay, 1/VIII, seven spec.

in 1900:

stat. 29. lat. 72° 42′ N., long. 14° 49′ W., between Greenland and JAN MAYEN, depth 2000 m., clay with foraminifers, 27/VIII, six spec. det. LÖNNBERG.

This magnificent Caridian was first obtained in four specimens during the third cruise of the Norwegian North Atlantic Expedition at stat. 295 between JAN MAYEN and Finmarken from a depth of 1110 fathoms. Remains of two other specimens were, after the return of the expedition, found in the stomach of *Rhodichthys regina* COLLETT from stat. 297 lying a litte farther west and from no less than 1280 fathoms. My specimens are from the same cold area, although the stations are situated somewhat farther north. From no other places has this species hitherto been obtained, so far as I know.

Some of my specimens were females carrying roe in different stages of development beneath the abdomen. In some of the eggs nearly whole the yolk was consumed, and the hind part of the body of the embryo had protruded from the embryonic membrane. In others the embryo was in a much less developed stage. The eggs are, comparatively speaking, very large and few in number as must be expected, considering the fact that the embryo does not leave the pleopods of the mother, before it has reached its complete state of development. As among so many animals inhabiting either the Arctic or Antarctic Oceans or the deep-sea, that rule seems to prevail also in the class of crustaceans. It was G. O. SARS, who, when examining *Bythocaris simplicirostris*, the type of the genus, first called attention to the great size of the eggs as possibly indicating a peculiar and abbreviate development. Other Arctic *Decapoda* exhibit the same condition. DOFLEIN[1] points out among such decapods *Hippolyte polaris*, *H. spinus*, *H. Gaimardii*, and *Sclerocrangon boreas*.

The colour of *Bythocaris leucopis* is a bright red with a lighter tint on the antennæ and the sides of the abdomen. The eyes are opaque white, as the specific name implies.

Length of my largest specimen from stat. 29, 1900, 77 mm., or, whith the antennal scalet, 95 mm., exactly the same length as SARS' greatest specimen attained.

15. **Bythocaris Payeri** (HELLER).

1878. (1875). Hippolyte Payeri HELLER, Crust., Pycnogon. and Tunicat. etc., l. c. p. 26, taf. I, fig. 1—4.
1877. Bythocaris Payeri G. O. SARS, Prodr. descript. Crust. etc., l. c. p. 240.
1882. » payeri HOEK, Crust. »Willem Barents» etc., l. c. p. 19, taf I, fig. 8—9.
1885. » Payeri G. O. SARS, Norw. North Atlant. Exp., l. p. 33, pl. III, fig. 27.
1897. » payeri BIRULA, Essai d'une faune des crustacés décapodes etc., l. c. p. 428.

Localities:

in 1898:

stat. 40. lat. 79° 58′ N., long. 9° 30′ E., 19—20 miles N.W. of Danish Island, depth 435 m., bottom temp. + 1,5° C., gray clay, stones, 27/VIII, one mutilated spec. with the eyes abnormally developed, the left being much larger than the rigth, which is nearly rudimentary.

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[1] l. c. p. 355.

in 1899:

stat. 2. lat. 62° 15′ N., long. 0° 37′ W., depth 670 m., mud with gravel, 1/VI, four spec.
» 17. lat. 71° 12′ N., long. 8° 38′ W., off Jan Mayen, depth 1275 m., gray clay, 24/VI, one spec.
» 18. lat. 74° 52′ N., long. 17° 16′ W., depth 350 m., muddy clay with sand and pebbles, 4/VII, nine spec.
» 25. lat. 72° 28′ N., long. 21° 48′ W., depth 180 m., mud with some stones, 24/VII, one spec.

in 1900:

stat. 16. lat. 72° 25′ N., long. 17° 56′ W., E. of Greenland, depth 300 m., stones and sand. 30/VII, det. Lönnberg.
» 21. East Greenland off Kaiser Franz Joseph Fiord between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, several spec., det. Lönnberg.
» 25. East Greenland, off the entrance of Kaiser Franz Joseph Fiord, depth 200—300 m., mud, 14/VIII, det. Lönnberg.
» 27. East Greenland, Kaiser Franz Joseph Fiord, Muskox Fiord, depth 220 m., clay, 21/VIII, det. Lönnberg.

This species was first described by Heller as *Hippolyte Payeri* on specimens obtained during the famous Austro-Hungarian Polar Expedition off Franz Joseph Land. Later on it occurred at no less than three stations during the Norwegian North Atlantic Expedition and it was referred by Sars to *Bythocaris* instituted by him some years before. Subsequently it has been found by »Willem Barents» Expedition at one station in Barents Sea and by Birula off Murman Coast. As seen above, it was obtained, during the last Swedish Arctic Expeditions, at nine stations in a rather considerable number of individuals.

My specimens do not show any differences from the descriptions of Heller and Sars. Like the last author, I have, however, in one fullgrown ovigerous female, observed one distinct although small spine on the anterior part of the dorsal carina, and also in some younger ones from the same station, viz. stat. 18. 1899, a very faint, nearly imperceptible trace of the same. Some females were carrying eggs, although the embryos were in a much less developed stage than those of the preceding species.

It ranges vertically from 200 until 2000 m. *Length* of greatest spec. 50 mm. The specimen from stat. 40, 1898, seems to be somewhat larger, but as it was not complete, its real size could not be ascertained.

Hippolyte LEACH 1813.

This genus includes numerous species many of which have been for a long time known. However, strange to say, but few families amongst the *Macrura* are involved in such confusion and are so much in need of a critical revision as this. In 1888, SPENCE BATE, when examining the material collected by the »Challenger», subdivided his family *Hippolytidæ* into several genera. He based his division mainly on the structure of the mandible, if provided with »synaphipod» (= palp) and »psalistoma» (= cutting edge) or not, on the number of the joints constituting the fifth joint or carpos (= »wrist») of the second pair of pereiopods and on the number and structure of branchiæ. Mainly by using these characteritics he was able to arrange the »Challenger» *Hippolytidæ* s. str. under no less than nine different genera.

It is only to be regretted that he did not at the same time examine and classify other forms belonging to this family. As far as I know, no other attempt has been made since that time as to a monographic study of the group. Amongst writers after SPENCE BATE some have adopted his genera, others not.

In his very useful and important book: »A History of Crustacea», STEBBING gives some interesting and critical reflections both on SPENCE BATE's new and somewhat complicated nomenclature, as well as on special points in his classification. In regard to *Hippolytidæ*, he adopts,[1] among others, SPENCE BATE's *Spirontocaris*, to which he refers the following North Atlantic and Arctic species: *Hippolyte spinus*, *H. turgida*, *H. Cranchii*, *H. pusiola*, *H. polaris*.

As to the genus *Hetairus*, the type of which SPENCE BATE regards our common Arctic *Hippolyte Gaimardi*, STEBBING points out[1] that Spence Bate's description is contradictory in one essential character, and even incorrect in another. For this reason he does not find it appropriate to maintain that genus.

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[1] l. c. p. 236, Arctic Crust. l. c. p. 10.

In a paper of Ortmann, published in Princeton Univ. Bulletin last year and cited by Doflein, I find that this author also adopts *Spirontocaris* and that he includes in this genus: *Hippolyte Gaimardi, H. Phippsi* (= *H. turgida*), *H. spinus, H. polaris* (= *H. borealis*, which Ortmann considers as specifically distinct) and *H. groenlandica.*

In this list, where only a few species have to be enumerated, I refrain from a critical study, for want of time and material, and I retain, therefore, the old name in the hope that a monograph of the family may soon appear. It has been promised by Doflein.

16. **Hippolyte Gaimardii** H. Milne Edwards.

1837.	Hippolyte	Gaimardii	Milne Edwards, Hist. Nat. Crust., tome II, p. 378.
1840—41.	»	»	Kröyer, Uds. nord. Art. Slægt. Hippolyte, l. c. p. 572.
1840—41.	»	gibba Gaimardii	Kröyer, ibidem, p. 572.
1842.	»	Gaimardii	Kröyer, Monogr. Fremst Slægt. Hippolytes nord. Art., l. c. p. 282, tab. I, fig. 21—29.
1842.	»	gibba	Kröyer, ibidem, p. 288, tab. I, fig. 30, tab. II, fig. 31—37.
1864.	»	Gaimardi	Goës, Crust. decapoda podopleth. mar. Sueciæ etc., l. c. p. 168.
1879.	»	Gaimardii	Smith, Stalk-eyed Crust. Atl. Coast North America etc., l. c. p. 67, pl. IX, fig. 8, 9.
1882.	»	gaimardii	Hoek, Crust. »Willem Barents» etc., l. c. p. 13.
1886.	»	Gaimardii	Koelbel, Crust., Pycnog. und Arachn. von Jan Mayen, l. c. p. 50.
1887.	»	»	Hansen, Dijmphna-togtets zool. bot. Udbytte, p. 238.
1888.	Hetairus	Gaimardii	Spence Bate, Crust. Macrusa, Chall. Rep., l. c. p. 611, pl. CIX, fig. 2.
1897.	Hippolyte	gaimardi	Birula, Essai d'une des crustacés décapodes etc., l. c. p. 425, tab. XX, fig. 2.

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[1] l. c. p. 235.

1899. Spirontocaris Gaimardii SCOTT, Crust. Franz Joseph Land, l. c. p. 63, pl. 3, fig. 3, 4.
1900. » » STEBBING, Arctic Crustacea, l. c. p. 9.

Localities:

in 1898:

stat. 5. lat. 75° 49′ N., long. 24° 25′ E., between Beeren Island and Hope Island, depth 80 m., bottom temp. — 1,42, rocky bottom, 21/VI, many spec.
» 6. lat. 76° 45′ N., long. 26° E., Hope Island, depth 40 m., rocky bottom, 22/VI, two spec.
» 8. lat. 76° 50′ N., long. 17° 20′ E., Stor Fiord, depth 14—18 m., stony bottom with Laminariæ, 25/VI, two spec.
» 12. West Spitzbergen, Recherche Bay near to Fox Glacier, depth 90 m., stony bottom, 4/VII, eight spec.
» 13. Recherche Bay, off Fox Glacier. depth 75 m., stony bottom with dead shells and soft bluish-gray clay, 5 VII, two spec.
» 22. lat. 78° 22′ N., long. 14° 53′ E., Ice Fiord, off Cape Boheman, depth 40—50 m., 21/VII, three spec.
» 39. lat. 79° 43′ N., long. 10° 52′ E., Danish Island, Virgos harbour, depth 25—30 m., gray mud, Laminariæ, 27 VIII, several spec.

in 1899:

stat. 22. lat. 73° 30′ N., long. 20° 18′ W., Cape Broer Ruys, depth 25—27 m., gravels, some red algas, 18/VII, one spec.
» 29. lat. 70° 27′ N., long. 22° 35′ W., Scoresby Sound, Cape Stewart, depth 13—18 m., mud, stones, algæ, 30/VII, two spec.
» 39. lat. 72° 45′ N., long. 22° 56′ W., depth 35—60 m., mud, some stones, 18/VIII, two spec.
Tromsö, depth 60—70 m., 22/VI, several spec. WULFF.
West Spitzbergen, Green Harbour, depth 110 m., 30 VI, several spec. WULFF.
North Spitzbergen, Danish Gate, depth 20—30 m., 7 VII, numerous spec. WULFF.

in 1900:

stat. 2. West Spitzbergen, Ice Fiord, Coal Bay, depth 100 m., rocks, 16/VI—20/VI, det. LÖNNBERG.
» 3. ibidem, depth 50—100 m., stones, 22 VI, det. LÖNNBERG.
» 17. East Greenland, Mackenzie Bay, N. of Kaiser Franz Joseph Fiord, depth 12—35 m., mud, 1/VIII—3/VIII, det. LÖNNBERG.
» 19. East Greenland, S.E. of Pendulum Island, lat. 74° 35′ N., long. 18° 15′ W., depth 150 m., mud and stones, 5/VIII, det. LÖNNBERG.
» 21. East Greenland, off Kaiser Franz Joseph Fiord between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, det. LÖNNBERG.

This species first mentioned by MILNE EDWARDS, was afterwards described by KRÖYER in his classical monograph of the Northern species of *Hippolyte*. At the same place he also describes another closely-allied form which he named *Hippolyte gibba*, the chief characteristic of which was: Annulus abdominalis tertius carina superficiei dorsalis triangulari valde compressa armatus est.»

GOËS was the first who suspected that this is a characteristic peculiar to the males, and SMITH came to the same conclusion that »KRÖYER'S *gibba* was based on old males of *H. Gaimardii*. HOEK is the only one who thinks that the peculiar form of the third segment of pleon is only an individual variation, but all subsequent writers accord in believing *H. Gaimardii* and *H. gibba* to be females and males resp. of the same species.

SPENCE BATE established for this species the genus *Hetairus* which, however, as already mentioned, STEBBING has shown, is based on incorrect characteristics, and which he, therefore, refers to *Spirontocaris*.

As synonymous with *Hippolyte Gaimardii* SMITH has put forwards *H. pandaliformis* BELL, and *H. Belcheri* BELL, and in this he has been followed by most writers.

The species has a very wide distribution. It occurs along West Greenland as far north as lat. 78 17′ N., off Grinnell Land, off Baffin Land, Labrador, Nova Scotia and East coast of United States as far south as Boston, »Arctic Ocean and Bering Straits» (STIMPSON), North-East coast of Asia. There it has been recorded from Franz Joseph Land, Nova Semla, Spitzbergen, Barents Sea, Murman Coast, Norway, Kattegat, Western part of Baltic, at Kiel, Scotland, Iceland, and, now, for the first time, from East Greenland.

Its vertical range is from a few fathoms up to 200 fathoms or more.

Length of greatest specimen (from East Greenland) 70 mm.

Its sexual maturity is very variable. I have measured females with roe the length of which varied from 40 mm. to 60 mm. The former ones were from stat. 39. 1898, where the bottom temperature was above zero, while the larger ones were dredged at stat. 5. 1898, where the temperature on the bottom was 1,$_{42}$ C. below zero. The individuals of that specimens collected by WULFF at Tromsö were all still smaller.

17. **Hippolyte spinus** (SOWERBY).

1805. Cancer spinus SOWERBY, British Miscellany, p. 47, tab. XXIII.
1817. Hippolyte Sowerbæi LEACH, Malac. Podophth. Brit., tab. XXXIX.
1842. » Sowerbei KRÖYER, Hippolytis nord. Arter, l. c. p. 298, tab. II, fig. 45—54.
1879. Hippolyte spinus SMITH, Stalk-eyed Crust. of Atlant. Coast of North America, l. c. p. 68.
1882. » » HOEK, Crust. »Willem Barents», l. c. p. 15, taf. I, fig. 4—7.
1886. » » KOELBEL, Crust., Pycnog. und Arachn. von JAN MAYEN, l. c. p. 49.
1887. » » HANSEN, Malacostraca mar. Groenl. occid., l. c. p. 41.
1888. Spirontocaris spinus SPENCE BATE, Crust. Macrura, Chall. Rep., l. c. p. 596, pls. CVICVI.
1900. Hippolyte spinus DOFLEIN, Dekap. Krebse arkt. Meere, l. c. p. 332.

Localities:

in 1898:

stat. 5. lat. 75° 49′ N., long. 24° 25′ E., between Beeren Island and Hope Island, depth 80 m., bottom temp. —1,42° C., rocky bottom, 21/VI, five spec.
» 12. West Spitzbergen, Recherche Bay near to Fox Glacier, depth 90 m., stony bottom, 4/VII, two spec.
» 35. lat. 80° 15′ N., long. 33° 10′ E., Giles Land (White Island), depth 40—50 m., rocky bottom, 18/VIII, one spec.
» 38. lat. 79° 47′ N., long. 14° 28′ E., entrance to Liefde Bay, depth 140 m., stony bottom with red algæ, 25/VIII, one spec.

in 1899:

stat. 39. lat. 72° 45′ N., long. 22° 56′ W., depth 35—60 m., mud, some stones, 18/VIII, four spec.
Tromsö, depth 60—70 m., 22/VI, two spec., WULFF.
West Spitzbergen, Green Harbour, depth 110 m., 30/VI, five spec. WULFF.

in 1900:

stat. 1. West Spitzbergen, Ice Fiord, Coal Bay, depth 50 m., stony bottom with dead shells, 16/VI—20/VI, det. LÖNNBERG.
» 2. Ibidem, depth 100 m., rocks, 16/VI—20/VI, det. LÖNNBERG.
» 3. » depth 50—100 m., stones, 22/VI, det. LÖNNBERG.
» 9. lat. 79° 10′ N., long. 11° E., West Spitzbergen, W. of Cape Mitra, depth 100 m., mud, 2/VIII, det. LÖNNBERG.
» 18. lat. 74° 30′ N., long. 18° 40′ W., East Greenland, S.E. of Walrus Island, depth 80—100 m., mud and stones, 4/VIII, det. LÖNNBERG.

This well-known species is subject to great variations with regard to the form of the rostrum and the number and size of its spines. Bearing this fact in mind, recent authors usually regard *Hippolyte securifrons* NORMAN, which has proved to be identical with *Hippolyte Lilljeborgii* DANIELSSEN, as synonymous with *Hippolyte spinus.*

Thus, SPENCE BATE has described and figured in his Challenger Report no less than seven varieties, and one must feel nearly convinced of the identity of both forms. As such these forms are also regarded, among others, by MIERS, HANSEN and STEBBING, whereas SMITH, SARS and ORTMANN are of a contrary opinion.

I have myself examined a good many specimens; but as I could not get NORMAN's original description, I do not think it advisable to pronounce with any degree of certainty about it. If that were not the case, then *Hippolyte Lilljeborgii* must claim priority, as DANIELSSEN published his »Beretning om en zoologisk Reise foretagen i Sommeren 1857» i Nyt Magazin for Naturvidenskaberne, Band 11, which appeared in the year 1861, and NORMAN's paper was published two years later.

DOFLEIN goes so far that he considers *Hippolyte Phippsi* (= *H. turgida*) as identical with young specimens af *H. spinus*, »besonders solchen, bei welchem das Rostrum noch nicht abgestossen war», l. c. p. 332. But, as usual, he does not enter upon detailed reasons for this view. He contents himself with the following remark: »Betrachte ich aber das gesammte Material, so kann ich so viel Uebergänge zu *H. Phippsi* feststellen, insbesondere zu den als *turgida* and *macilenta* von KRÖYER als besondere Arten beschriebenen Formen von *Phippsi*, dass ich glaube, es handelt sich nur um eine Art, welche dem *Prioritätsgesetze* gemäss den Namen *H. spinus* SOW. *tragen muss.* Diese Annahme wird auch durch die ganz gleichartige Verbreitungsweise der fraglichen Species unterstützt (!).[1] Die Auffassung von SP. BATE (Chall. Rep.) leitet zu der hier vorgetragenen über.» Strangely enough, he enumerates, however, both *Hippolyte Phippsi* and *H. spinus* and even *H. Lilljeborgi* (= *H. securifrons*) as distinct species. It is to be regretted that the author did not give any detailed descriptions, accompanied with figures, of the transitional forms between both species, as such would have proved of very great interest.

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[1] As he himself points out, this is circumpolar for both forms.

As to my own opinion, I can not, at any rate at present think that DOFLEIN is right in this view. I have examined and compared a not inconsiderable number of both species, but I was not able to observe any intermediate forms. On the contrary, both forms seemed, in my collection, to be so very distinct, that I was able at the very first glance, to separate them. In nearly all specimens of *Hippolyte spinus* the rostrum had the typical form as figured by KRÖYER in tab. II, fig. 45, l. c. whereas hardly any one specimen of *H. turgida* deviated in the form of rostrum from fig. 57 on the same plate, or from fig. 64 on pl. III. As most of them were females carrying roe, the prevailing form of rostrum was that figured in fig. 57 by KRÖYER as typical for his *Hippolyte turgida*. Besides that, it is very easy to distinguish both species (at least, the females) on the more robust form of the body and its smaller size in *Hippolyte turgida* than in *H. spinus*. The spines on the dorsal carina are also, in this species, much stronger and larger than in *H. turgida*. However, it is possible they may be united under one species, and it is for this reason that further details on transitional forms would be very welcome.

Hippolyte spinus has a very extensive distribution within the Arctic region. It is obtained off the coasts of the following countries: West Greenland as far north as Cape York and Ingelfield Gulf, Grinnel Land, Baffin Land, Labrador, Nova Scotia, New England as far south as Massachusetts Bay, where it is by far the most abundant species of the genus (SMITH, l. c. p. 69), Alaska, Behring Strait, Kamtschatka, Nova Zembla, Kola Peninsula, Finmarken, Beeren Island, Spitzbergen, East Greenland. But here it seems to be rather rare, as it occurred only at two stations during the last Swedish Expeditions. Although it is very probable that it has a circumpolar range, it is, however, worth remarking that it has not as yet been found in the shallow sea along the Siberian coast from Nova Zembla in the west to Bering Sea in the east.

If *Hippolyte Lilljeborgi* is identical it goes farther south along the West Coast of Norway and Scotland. It lives mainly in depths from a few to 50 fathoms, but it has also but seldom, been dredged in deeper water until 200—240 fathoms.

Length of largest spec. 62 mm.

It was, although very seldom, infested by apparently the same *Piscicolid* which is so common a parasite on *Sclerocrangon boreas.*

18. **Hippolyte turgida** KRÖYER.

1840—41.	Hippolyte	turgida	KRÖYER, Uds. nord. Art. Slægt. Hippolyte, l. c. p. 575.
1840—41.	»	Phippsii	KRÖYER, ibidem, p. 575.
1842.	»	turgida	KRÖYER, Monogr. Fremst. Slægt. Hippolytes nord. Arter, l. c. p. 308, tab. II, fig. 57—58, tab. III, fig. 59—63.
1842.	»	Phippsii	KRÖYER, ibidem, p. 314, tab. III, fig. 64—68.
1864.	»	»	GOËS, Crust. decapoda podophth. mar. Sueciæ etc., l. c. p. 169.
1874.	»	turgida	BUCHHOLZ, Crust. Zweite deutsche Nordpolarfahrt, l. c. p. 273.
1874.	»	Phippsii	BUCHHOLZ, ibidem, p. 274.
1879.	»	»	SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 73.
1882.	»	Phippsii	HOEK, Crust. »Willem Barents», l. c. p. 17.
1897.	»	»	BIRULA, Essai d'une faune des crustacés décapodes etc., l. c. p. 422.
1899. (?)	Spirontocaris	Phippsii	SCOTT, Crust. Franz Josef Land, l. c. p. 63, pl. 3, fig. 3, 4.
1900.	»	turgida	STEBBING, Arctic Crustacea, l. c. p. 10.

Localities:

in 1898:

stat. 10. lat. 77° 9′ N., long. 14° 40′ E., off the Islands, depth 90 m., soft, gray clay, 27/VI, one spec.

13. West Spitzbergen, Recherche Bay off Fox Glacier, depth 75 m., stony bottom with dead shells and soft bluish-gray clay. 5/VII, two spec.

22. lat. 78° 22′ N., long. 14° 53′ E., Ice Fiord, off Cape Boheman, depth 40—50 m., 21/VII, one spec.

39. lat. 73° 43′ N., long. 10° 52′ E., Danish Island, »Virgo's harbour», depth 15—30 m., gray mud, Laminariæ, 27/VIII. three spec.

in 1899:

stat. 29. lat. 70° 27′ N., long. 22° 35′ W., Scoresby Sound, Cape Stewart, depth 13—18 m., mud, boulders, algæ, 30/VII, one spec.

Tromsö, depth 60—70 m., 22/VI, many spec. WULFF.

West Spitzbergen, Green Harbour, depth 110 m., 30/VI, one spec. WULFF.

North Spitzbergen, Danish Gat, depth 20—30 m., 7/VII, many spec. WULFF.

in 1900:

stat. 1. West Spitzbergen, Ice Fiord, Coal Bay, depth 50 m., stony bottom with dead shells, 16/VI—20/VI, det. LÖNNBERG.

» 3. ibidem, depth 50—100 m., stones, 22/VI, scarce, det. LÖNNBERG.

The first one who suspected that *Hippolyte turgida* and *H. Phippsii* were only female and male resp. of the same species was GOËS who, in the paper cited above, says: »Centurias perlustravi Spetsbergenses, nec feminam umquam inveni; Hippol. turgidæ KRÖYER, valde affinis et sodalis, inter specimina 100 circiter masculum nullum vidi, quare, et differentiis tam exiguis, inclinat animus, ut illam hujus marem arbitrer.»

As far as I know, BUCHHOLZ is the only author subsequent to GOËS who does not confirm this opinion. He bases the contrary supposition on the fact that he found amongst about 30 specimens of *Hippolyte Phippsii* one female of a length of 33 mm., and because males, although relatively very scarce, are nevertheless, to be observed in *H. turgida*. For this reason he does not consider them as different sexes of the same species, but only as varieties. As SMITH has shown, young ones of both forms are indistinguishable, except in the sexual characteristics, and, in this sense, GOËS' statement is not strictly true, but, with regard to fullgrown specimens, SMITH says that he never saw males agreeing with *H. turgida* as described by KRÖYER. As to the above mentioned male of *H. turgida*, SMITH does not hazard the supposition that there was some error in BUCHHOLZ' determination; yet it can hardly be explained otherwise, as no subsequent author, as far as I know, mentions a similar case, but all agree in regarding both forms as identical.

As synonymous with *Hippolyte turgida* SMITH considers *Hippolyte vibrans* STIMPSON, and, with a sign of interrogation, *Hippolyte ochotensis* BRANDT.

In regard to the priority of *turgida* or *Phippsii* STEBBING remarks, in his usual humourous style, that it »has been as a rule set aside, probably under the idea that the male was so obviously the superior animal that no rules of nomenclature could compete with its claim to preferential note».

This species is widely distributed within the Arctic sea. It has been obtained at East Greenland, West Greenland as far north as Port Foulke, lat. 78° 17′ N., Grinnell Land in lat. 81° 44′ N., Baffin Land, Labrador, Nova Scotia, East coast of United States as far south as Massachusetts Bay, Arctic North America and Behring Sea, Sea of Okhotsk (?), Arctic coast of Siberia, Kara Sea, Nova Zembla, Franz Joseph Land (?), White Sea, Spitzbergen, Northern coasts of Norway, although rare south of the Arctic Circle.

HANSEN, on reasons which he puts forwards in his *Malacostraca marina Groenlandiæ occidentalis* regards this species as an inhabitant of the coast, living commonly in depths from three up to 25 fathoms, and occurring spontaneously perhaps in deeper water, but hardly in more than 60 fathoms.

Length of greatest spec. (from stat. 13, 1898) 41 mm.

The specimens from Tromsö, although fullgrown, were all much smaller, attaining about half that length.

19. **Hippolyte pusiola** KRÖYER.

1840—41.	Hyppolyte	pusiola	KRÖYER. Uds. nord. Art. Slægt. Hippolyte, l. c. p. 576.
1842.	»	»	KRÖYER, Monogr. Fremst. Slægt. Hippolytes nord. Art, l. c. p. 319, tab. III, fig. 69—73.
1879.	»	»	SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 77, pl. IX, figs. 4—7.
1897.	»	»	BIRULA, Essai d'une faune des crustacés décapodes etc., l. c. p. 423.

Locality:

in 1899:

Tromsö, depth 60—70 m., 22/VI, four spec., WULFF.

Distribution: Murman Coast, Coast of Norway, Skagerack, Kattegat, coast of Scotland, Iceland, East coast of North America from Connecticut as far north as Nova Scotia and Prince Edward Island. Thus, this small *Hippolyte* does not seem to be an Arctic form, but it belongs rather to the Northern parts of the North Atlantic both on the European and the American side.

SMITH who has, with his usual carefulness, examined more than a hundred specimens, gives, in his Stalk-eyed Crustaceans of the Atlantic Coast of North America north of Cape Cod, details as to the variation in rostrum, telson, and colour.

The largest specimen (a female carrying egg) measured 19 mm. According to SMITH, it reaches a length of 25 mm.

20. **Hippolyte polaris** (SABINE).

1821.	Alpheus	polaris	SABINE, Parry's Voyage, Appendix n:o X, Zoology, k. 60, pl. II, fig. 5—8 (cited after STEBBING).
1835.	Hippolyte	polaris	OWEN, Ross's 2nd Voyage, App. Zool., p. LXXXV.
1835.	»	borealis	OWEN, ibidem, p. LXXXIV, pl. B, fig. 3.
1840—41.		polaris	KRÖYER, Uds. nord. Art. Slægt. Hippolyte, l. c. p. 577.
1840—41.	»	borealis	KRÖYER, ibidem, p. 577.
1842.		polaris	KRÖYER, Monogr. Fremst. Slægt. Hippolytes nord. Art., l. c. p. 324, tab. III, fig. 78—81, tab. IV, fig. 82.
1842.	»	borealis	KRÖYER, ibidem, p. 330, tab. III, fig. 74—77.
1864.	»	polaris	GOËS, Crust. decap. podophth. mar. Sueciæ, l. c. p. 169.
1874.	»	»	BUCHHOLZ, Crust. Zweite deutsche Nordpolarfahrt, l. c. p. 275.
1874.	»	borealis	BUCHHOLZ, ibidem, l. c. p. 276.
1879.	»	polaris	SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 80.
1882.	»	»	HOEK, Crust. »Willem Barents», l. c. p. 18.
1886.	»	»	KOELBEL, Crust., Pycnog. und Arachn. von JAN MAYEN, l. c. p. 49.
1897.	»	»	BIRULA, Essai d'une faune des crustacés décapodes etc., l. c. p. 424.
1899.	Spirontocaris	polaris	SCOTT, Crust. Franz Josef Land, l. c. p. 63.
1900.	»	polaris	STEBBING, Arctic Crustacea, l. c. p. 7.

1900. Hippolyte polaris DOFLEIN, Dekap. Krebse arkt. Meere, l. c., p. 334.
1900. » borealis DOFLEIN, ibidem, l. c. p. 335.

Localities:

in 1898:

stat. 5. lat. 75° 49′ N., long. 24° 25′ E., between Beeren Island and Hope Island, depth 80 m., bottom temp. — 1,42° C., rocky bottom, 21/VI, several spec.
» 13. West Spitzbergen, Recherche Bay, off Fox Glacier, depth 75 m., stony bottom with dead shells and soft bluish-gray clay, 5/VII, one spec.
» 20. West Spitzbergen, Ice Fiord, North Fiord, off Cape Wærn, depth 36 m.. boulders Lithothamnia, with soft reddish-brown clay, 19/VII, one spec.
» 22. lat. 68° 22′ N., long. 14° 53′ E., Ice Fiord, off Cape Boheman, depth 40—50 m., 21/VII, many spec.
» 24. Spitzbergen, Ice Fiord, 400 m., 24/VII, one spec.
» 29. lat. 78° 40′ N., long. 27° 10′ E., King Charles Land, Swedish Foreland, depth 14—16 m., bottom temp. + 0,9° C., fine, grayish-black sand, stones, mud, and algæ, 5/VIII. seven spec.
» 30. King Charles' Land, Swedish Foreland, depth 10—16 m., fin, grayish-black sand, stones, mud, and algæ, 6/VIII, nine spec.
» 32. King Charles' Land, Rival Sound, depth 100—110 m., bottom temp. — 1,45° C., soft clay with boulders, 8/VIII, several spec.
» 34. lat. 78° 50′ N., long. 29° 39′ E., King Charles' Land, depth 60—70 m., soft grayish-black clay, 17/VIII, one spec.
» 35. lat. 80° 15′ N., long. 33° 10′ E., Giles land (White Island), depth 40—50 m., rocky bottom, 18/VIII, two spec.
» 36. lat. 80° 45′ N., long. 25° 20′ E., Charles XII Island, depth 60—70 m., rocky bottom with corallines, 20/VIII, one spec.
» 38. lat. 79° 47′ N., long. 14° 28′ E., entrance of Liefde Bay, depth 140 m., stony bottom with red algæ, 25/VIII, numerous spec.
» 39. lat. 79° 43′ N., long. 10° 52′ E., Danes Island, Virgo's harbour, depth 25—30 m., gray mud, Laminariæ, 27/VIII, several spec.
» 42. lat. 73° 3′ N., long. 18° 30′ E., between Beeren Island and Norway, depth 410 m., bottom temp. + 2° C., gray clay, 4/IV, two spec.

in 1899:

stat. 18. lat. 74° 52′ N., long. 17° 16′ W., depth 350 m., muddy clay, sand, pebbles, 4/VII, four spec.

stat. 21. lat 74° 10′ N., long. 20° 8′ W., S.E. of Clavering Island, depth 25—40 m., mud, abundant dead shells and pebbles, 17/VII, one spec.

22. lat. 73° 30′ N., long. 20° 18′ W., Cape Broer Ruys, depth 25—27 m., gravels, some red algæ, 18/VII, one spec.

23. lat. 73° 26′ N., long. 21° 13′ W., Cape Bennett, depth 9—11 m., sandy mud, algas, 19/VII, two spec.

24. lat. 73° 20′ N., long. 21° 20′ W., depth 70 m., muddy bottom, some pebbles and dead shells, 21/VII, three spec.

27. lat. 71° 35′ N., long. 21° 10′ W., depth 260 m., stones, mud, 27/VII, one spec.

39. lat. 72° 45′ N., long. 22° 56′ W., depth 35—60 m., mud, some stones, 18/VIII, five spec.

42. lat. 72° 56′ N., long. 24° 33′ W., King Oscar Fiord, depth 125 m., mud, some pebbles and sand, 24/VIII, two spec.

43. lat. 73° 32′ N., long. 24° 38′ W., Kaiser Franz Joseph Fiord, Cape Weber, depth 100—110 m., mud with gravels and stones, 28/VIII, ten spec.

North Spitzbergen, Danes Gat, depth 20—30 m., 7/VII, many spec. WULFF.

North Spitzbergen, Treurenberg Bay, 10—20 m., 10/VIII, five spec., WULFF.

in 1900:

stat. 2. West Spitzbergen, Ice Fiord, Coal Bay, depth 100 m., rocks, 16/VI—20/VI, det. LÖNNBERG.

3. ibidem, depth 50—100 m., stones, 22/VI, det. LÖNNBERG.

4. ibidem, off Coal Bay, depth 150—200 m., 23/VI; seven spec., det. LÖNNBERG.

5. ibidem, Green Harbour, depth 10—80 m., stones, 25/VI, two spec.

8. West Spitzbergen, Kings Bay, depth 10—30, stones and sand with Laminariæ, 29/VI, two spec.

9. lat. 79° 10′ N., long. 11° E., W. of Cape Mitra, depth 100 m., mud, 2/VII, two spec., det. LÖNNBERG.

16. lat. 72° 25′ N., long. 17° 56′ W., E. of Greenland, depth 300 m., stones and sand, 30/VII, numerous spec. det. LÖNNBERG.

17. East Greenland, Mackenzie Bay N. of Kaiser Franz Joseph Fiord, depth 12—35 m., mud, 1/VIII—3/VIII, many spec., det. LÖNNBERG.

18. East Greenland, S. E. of Walrus Island, lat. 74° 30′ N., long. 18° 40′ W., depth 80—100 m., mud and stones, 4/VIII, det. LÖNNBERG.

19. East Greenland, S.E. of Pendulum Island, lat. 74° 35′ N., long. 18° 15′ W., depth 150 m., mud and stones, 5/VIII, seven spec., det. LÖNNBERG.

stat. 21. East Greenland, off Kaiser Franz Joseph Fiord between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, many spec., det. LÖNNBERG.

» 22. East Greenland, Mackenzie Bay N. of Kaiser Franz Joseph Fiord, depth 12—18 m., mud, 9/VIII, one spec., det. LÖNNBERG.

» 25. East Greenland, entrance of Kaiser Franz Joseph Fiord, depth 200—300 m., mud, 14/VIII, seven spec., det. LÖNNBERG.

As in the case of *Hippolyte Gaimardii* and, *H. gibba*, and that of *H. turgida* and *H. Phippsii*, GOËS first regarded SABINE'S *H. polaris* and OWEN'S *H. borealis* as identical. He says: Differentiam ullam specificam inter hanc H. borealim et H. polarem numquam percepi, nec hujus feminam inter copiam speciminum ditissimam inveni. GOËS' conclusion that *H. borealis* is the male of *H. polaris* was accepted by nearly all subsequent writers, such as SMITH, SARS, HANSEN, STEBBING etc. BUCHHOLZ who, in his important memoir cited above, and always characterized by great exactness, enumerates them as distinct species, however, says, about *H. polaris*: »Die grössten Exemplare vorzugsweise Weibchen, die Männchen durchschnittlich kleiner bis zu 50, oder höchstens 55 mm.» and about *H. borealis*: »Der vorigen *H. polaris* sehr nahe stehend und nur durch die sehr eigentümliche Form des Rostrum verschieden — — —. *Zusammen mit der vorigen, von welcher sie vielleicht nur eine Abänderung ist*, indessen viel weniger zahlreich. — — — *Sämmtliche ostgrönländische Stücke sind Männchen* — —». After a careful examination of the great mass of material I have had at my disposal both now and some years ago, I fully agree with SMITH, who was the first to conclude that *H. borealis* represents »adult males, or perhaps more properly old males», while *H. polaris* are females and young males. Amongst recent writers, ORTMANN is the only one, as far as I know, who regards them as distinct species. ORTMANN says:[1] »Ob diese Art, *H. borealis*, als ♂ zu *H. polaris* gehört — — —, bleibt noch zu erweisen, da mir ein ♂ mit den Charakteren von polaris vorliegt.» The author had examined according to the list of localities given by him *H. polaris* a) 1 ♂ 1 ♀ Grönland, b) 1 ♀ Norwegen, Bergen, and of *H. borealis* a) 2 ♂ Ost-Grönland. I do not know if it is advisable to draw from this material, conclusions at variance with those of SMITH, SARS and others who have examined many hundred specimens, not withstanding the fact that these authors do not deny that *young* males agree in the form and armament of the rostrum and in the possession of a pterygostomian spine.[1]

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[1] Decapoden Krebse. Strassburg. Museum, l. c. p. 502.

SMITH regards *Hippolyte cultellata*, and DOFLEIN *H. amazo* PFEFFER as synonymous, in which view they are, no doubt, right.

Hippolyte polaris is strictly circumpolar and arctic. It has been found on both sides of Davis Strait, Baffin Bay, and Smith Sound, along the coasts of Labrador, Nova Scotia, and New England as far south as Massachusetts Bay, Behrings Straits, Franz Joseph Land, Kara Sea, Nova Zembla, Spitzbergen, Beeren Island, Norway, Bohuslän, North Sea.

The largest specimens which I have examined were obtained round King Charles Land and from East Greenland at a depth of 100—200 m. which agrees with observations made by HANSEN and, recently, by DOFLEIN. It has been taken in depths ranging from a few up to 260 fathoms.

Length of largest spec. (from East Greenland) 89 mm.

21. **Hippolyte groenlandica** (J. C. FABRICIUS).

1775.	Astacus Groenlandicus	J. C. FABRICIUS, Systema Entomologiæ, p. 416.
1780.	Cancer aculeatus	O. FABRICIUS, Fauna Groenlandica, p. 239, n:o 217.
1840	41. Hippolyte aculeata	KRÖYER, Uds. nord. Art. Slægt. Hippolyte, l. c. p. 578.
1842.	» »	KRÖYER, Monogr. Fremst. Slægt. Hippolytes nord. Art., l. c. p. 334, tab. IV, fig. 83—98, tab. V, fig. 99—104.
1874.	» »	BUCHHOLZ, Crust. Zweite deutsche Nordpolarfahrt, l. c. p. 276.
1879.	» »	SMITH, Stalk-eyed Crust. Atl. Coast of North America, l. c. p. 85.

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[1] DOFLEIN, l. c. p. 335, seems at first to have the same opinion as his German collega, but says: Während ich im Beginn der Bearbeitung des Materials gegen diese Auffassung (von SARS, SMITH, RICHTERS u. a.) Stellung nehmen zu müssen glaubte, habe ich mich schliesslich noch während der Drucklegung des Manuskriptes zu ihr bekehrt; daher konnte ich die Arten nicht mehr zu der einen (*H. polaris* SAB.) nach dem Prioritätsgesetz zusammenziehen.»

Loocalities:

in 1899:

stat. 22. lat. 73° 30′ N., long. 20° 18′ W., Cape Broer Ruys, depth 25—27 m., gravels, some red algæ, 18/VII, one spec.
» 39. lat. 72° 45′ N., long. 22° 56′ W., depth 35—60 m., mud, some stones, 18/VIII, six spec.

in 1900:

stat. 17. East Greenland, Mackenzie Bay N. of Kaiser Franz Joseph Fiord, depth 12—35 m., mud, 1/VIII—3/VIII, det. LÖNNBERG.
» 22. East Greenland, ibidem, depth 12—18 m., mud, 9/VIII, det LÖNNBERG.

This large and easily-recognizable species was first described by J. C. FABRICIUS as *Astacus Groenlandicus* and, five years later, by O. FABRICIUS as *Cancer aculeatus*. Both names are very appropriate, although the first must have priority. It seems to be restricted, in its horizontal distribution, mainly to the seas about Greenland. It occurs numerously along the West Coast of Greenland as far north as lat. 82° 30′ N., along the West coast of Baffin Bay and Davis Strait and, farther south, to Massachusetts Bay. It is also recorded from Behring Sea and the Polar Archipelago of North America.[1] Although BUCHHOLZ says that it is «an der ostgrönländischen Küsten häufig und wie es scheint ziemlich allgemein verbreitet», it must be remarked that it was obtained here only at four stations out of more than sixty where dredgings were carried on by the Swedish Expeditions in 1899 and 1900.

It ranges bathymetrically from a few fathoms to 200, and it seems to live on very variable bottom.

Length of largest spec. (a female with roe) 92 mm. HANSEN has measured a specimen, in the Museum of Copenhagen, of a length of 113 mm. SMITH has given, in his paper, cited above, some details as to the colour.

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[1] Also on the Pacific coast of North America, it is found as far south as Puget Sound. (CALMAN, Crust. fr. Puget Sound, l. c. p. 260.)

Pandalus LEACH 1814.

22. **Pandalus borealis** KRÖYER.

Fig. 2.

1838—39. Pandalus borealis KRÖYER, Consp. Crust. Groenl., l. c. p. 254.
1844—45. » » KRÖYER, Karcinol. Bidr., l. c. p. 461.
1846 (?). » » KRÖYER, Voy. in Scand. etc., pl. 7, fig. 2 a—o.

Localities:

in 1898:

stat. 9. lat. 76° 46′ N., long. 15° 22′ E., off Horn Sound, depth 210 m., bottom temp. + 2,83° C., soft, grayish-black clay, 26/VI, several small spec.
» 21. lat. 78° 27′ N., long. 15° 20′ E., Ice Fiord, North Fiord, between Cape Wærn and Cape Thordsen, depth 175 m., soft, reddish-brown clay, 19/VII, one spec.
24. West Spitzbergen, entrance of Ice Fiord, depth 400 m., bottom temp. + 3° C., 24/VIII, (failure) three spec.
» 25. lat. 78° 4′ N., long. 11° 37′ E., 12′ S. af King Charles Land, depth 240 m., bottom temp. + 3,15° C., pebbles with soft, grayish-black clay, 24/VII, two spec.
37. lat. 81° 14′ N., long., 22° 50′ E., N.E. of Seven Islands, depth 150 m., bottom temp. + 2° C., gray clay, 20/VIII, six small spec.
» 40. lat. 79° 58′ N., long. 9° 30′ E., 19—20 miles N.W. of Danish Island, depth 435 m., bottom temp. + 1,5° C., gray clay, boulders, 27/VIII, one spec. (mutilated).
» 42. lat. 73° 3′ N., long. 18° 30′ E., between Beeren Island and Norway, depth 410 m., bottom temp. + 2° C., gray clay, 4/IX, several spec.

in 1899:

stat. 1. lat. 61° 16′ N., long. 1° 18′ E., depth 150 m., sand, some stones and dead shells, 31/V, one small spec. (mutilated).

in 1900:

stat. 6. entrance of Ice Fiord, West Spitzbergen, depth 350 m., mud, 26/VI, det. LÖNNBERG.
» 9. lat. 79° 10′ N., long. 11° E., W. of Cape Mitra, West Spitzbergen, depth 100 m., mud, 2/VII, det. LÖNNBERG.

The absence of chelæ of the first pair of pereiopods has hitherto, as far as is known, been regarded as one of the most important characteristics of *Pandalus*. CAULLERY was the first who called attention to the fact that, amongst the true *Pandalids*, there is an exception to this rule. In his paper on »Crustacés Schizopodes et Décapodes» de la Campagne du »Caudan» dans le Golfe de Gascogne, l. c. p. 379, he has described a new species provided with minute chelæ on the first pair of pereiopods. On this character he established with full right a new subgenus *Dichelopandalus*, but, at the same time, he suspects that this chela may also be found among other species. His advice to keep a look-out for such species has been followed by CALMAN, who was able to state the existence of such in no less than seven other species.[1] Also in *Pandalus borealis* he found a chela. In fig. 2 I have figured it. Strictly speaking, this species should therefore be included in the genus *Dichelopandalus*, but as there is good reason to believe that, on a closer examination, still more species will be found to possess this characteristic (which, after the finds of CALMAN, does not seem to be of a very high generic value) I prefer to retain the old name.

Distribution: West Greenland up to 70° 40′ N. (HANSEN), East coast of North America, Behring Sea, Barents Sea, Spitzbergen, Norway, south to Cattegat. It is generally considered to be a true arctic and circumpolar species; but I only wish to call attention to the fact that, during our three last Swedish Expeditions, as seen above, it was not obtained either E. of Spitzbergen, or along the coast of East Greenland, whereas it was taken in considerable numbers in suitable depths, off West Spitzbergen. Also, during the German expeditions on board »Helgoland» and »Olga», it was only obtained in Ice Fiord, the Hinlopen Strait, and at the entrance of the White Sea. In none of my stations was the bottom temperature below zero, and all are situated within the area where the Gulf Stream prevails. Even Hinlopen Strait is, at least in some years, influenced by this warm current, as is already shown by WALTHER and KÜKENTHAL. It is a very remarkable fact that neither I nor SCHAUDINN nor RÖMER obtained any single specimen farther eastwards, round King Charles Land, during our numerous trawlings; but, at least in the summer of 1898, the bottom temperature was, in that tract of the

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[1] CALMAN, on the British *Pandalidæ*, l. c. p. 28.

Arctic Ocean, generally below zero. This circumstance inclines me to believe that *Pandalus borealis* ought not to be regarded as a true Arctic form, but rather as an North Atlantic (and North Pacific) species. In this view I am confirmed by the circumstance that it has not as yet been obtained along the East coast of Greenland, in Smith Sound, or along the West coast of Baffin Land, where the Arctic Current is sweeping south.

Pandalus borealis is mostly found in depths varying from 100 to 500 m. Whether it lives or not at the very bottom, is an open question. It is, in my opinion, very probable that, perhaps during the most part of its life, like many other decapods and schizopods, it swims in great shoals in the deeper strata of the water, and is only occasionally found creeping along the bottom. In proof of this I may mention that I once got, at station 24 in 1898, some large specimens, although the great trawl had capsized, so that true bottom-animals did not come up. However, the trawl had reached the bottom, inasmuch as there some clay was adhering to it. However, I never got this species in the vertical plankton net, but that must be explained simply by the great swiftness of this animal, which very easily escapes the relatively small opening of the net.

As to the *colour*, I refer to SMITH, Stalk-eyed Crustaceans of the Atlantic Coast of North America, l. c. p. 86.

Length of one of the largest specimens 122 mm. The largest specimen HANSEN measured, reached a length of 129 mm.

Fam. Pasiphæidæ.

Pasiphæa SAVIGNY 1816.

23. **Pasiphæa tarda** KRÖYER.

1844—45. Pasiphae tarda KRÖYER, Karcinol. Bidr., l. c. p. 453.
1846. » » KRÖYER, Voy. en Scand. etc., pl. 6, fig. 1. A. B. a—o.
1868. Pasiphaë norvegica M. SARS, Bidr. til Kundsk. etc., l. c. p. 282, tab. IV, V, fig. 81, 87—90.
1877. » tarda G. O. SARS, Prodr. descr. Crust. etc., l. c. p. 242.

1879. Pasiphaë tarda SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 88, pl. X, fig. 1.
1882. » » G. O. SARS, Overs. af Norges Crust. etc., l. c. p. 48.

Localities:

in 1900:

I. lat. 73° 30′ N., long. 2° W., depth 3000—0 m., vertical net, two spec.
II. lat. 73° N., long. 2° W., depth 1500—0 m., vertical net, 13 VII, one spec.
III. lat. 73° 15′ N., long. 2° 50′ W., depth 3000—0 m., vertical net, one spec.

This species, which is very closely allied to the type of the genus, viz. *Pasiphæa sivado* (RISSO), has been obtained at: »South Greenland», »Greenland» (only three specimens are, according to HANSEN, as yet known from that sea, two of which are KRÖYER's type specimens), Irminger Sea, off West coast of Norway very far from land, Gulf of Maine, 42 miles E. by S. from Cape Ann.

Length of greatest spec. 56 mm.,
» » antennæ 122 mm.

As to the identity of *Pasiphæa tarda* and *Pasiphæa norvegica*, I refer to G. O. SARS' papers cited above.

Fam. **Ephyridæ.**

Hymenodora SARS 1877.

24. **Hymenodora glacialis** (BUCHHOLZ).

1874. Pasiphaë glacialis BUCHHOLZ, Crust. Zweite Deutsche Nordpolarfahrt etc., l. c. p. 279.
1877. Hymenodora » G. O. SARS, Prods. descript. Crust. etc., l. c. p. 240.
1885. » » G. O. SARS, Norw. North. Atl. Exp. Crust. I., p. 37, pl. 4.
1885. » » SMITH, On some new or little known Decapod Crustacea etc., l. c., p. 501.

Localities:

in 1898:

stat. 26. lat. 77° 39′ N., long. 1° 17′ E., »the Swedish Depth», depth 3200 m., bottom temp. — 1,4° C., Biloculina clay, 27/VII, six spec.

in 1899:

stat. 3. lat. 63° 36′ N., long. 0° 26′ E., depth 1900 m. 2/VI, nine spec.

in 1900:

stat. 21. East Greenland, off Kaiser Franz Joseph Fiord between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, det. LÖNNBERG.

29. lat. 72° 42′ N., long. 14° 49′ W., between Greenland and JAN MAYEN, depth 2000 m., clay with foraminifers, 27/VIII, det. LÖNNBERG.

lat. 73° 15′ N., long. 2° 50′ W., depth 3000—0 m., vertical net, many spec., det. LÖNNBERG.

» lat. 72° 50′ N., long. 3° 8′ W., depth 2700—0 m., vertical net, det. LÖNNBERG.

» lat. 71° 18′ N., long, 9° 20′ W.,. depth 2000—0 m., vertical net, det. LÖNNBERG.

This beautiful species was first described by BUCHHOLZ on a specimen floating on the surface not far from the pack-ice in about lat. 74° N., off the East coast off Greenland. He referred it to *Pasiphæa*, to which it has a certain resemblance. On the Norwegian North Atlantic Expedition it was obtained at 14 stations, all situated in the cold area between about lat. 80° N. and lat. 63° S., and between the longitudes of Spitzbergen, Beeren Island, Norway, on the one side, and East Greenland, Jan Mayen, Iceland, on the other. SARS was then enabled to give a fuller description of this bathypelagic decapod. In the same year, 1885, SMITH records it as also occurring in the deeper places of an area off the East coast of United States, between lat. 35° 45′ N., and lat. 40° 26′ N., and between long. 67° 5′ W. and long. 74° 31′ W. in depths ranging from 861 to 2949 fathoms. It was also obtained during the »Fram» Expedition in about lat. 80° N., long. 134° E. the tow-net having been lowered to a depth of 300 metres. SARS' specimens were all captured in depths varying from 452 to 1862 fathoms. The smallest depth from which it has been taken is 250 metres in stat. 21, 1900. But these figures give, of course only, an approximate value, and it is only by means of shutting nets that we might expect to get certain information as to its bathymetrical range.

One specimen was infested by the parasitic cirrhiped, *Sylon hymenodoræ* G. O. Sars.

Colour bright red.

Length of largest spec. 69 mm.

Schizopoda.

Fam. **Euphausiidæ.**

Nyctiphanes G. O. Sars 1883.

This genus was instituted by Sars, in his »Preliminary Notices on the Schizopoda of H. M. S. »Challenger» Expedition», to receive the Northern *Thysanopoda Couchii* Bell and *Thysanopoda norvegica* M. Sars and a new nearly related form, viz. *Nyctiphanes australis* from Bass' Strait. It is mainly characterized by a membraneous reflexed leaflet on the basal joint of the antennulæ, and by the rudimentary and dissimilar state of the two hindmost pairs of legs.

25. **Nyctiphanes norvegica** (M. Sars).

1857. Thysanopoda norvegica M. Sars, Om 3 nye norske Krebsdyr, l. c. p. 169.
1864. » » M. Sars, Udförlig Beskrivelse etc., l. c. p. 2.
1864. » nana M. Sars, Tillæg til etc., l. c. p. 84.
1878. » Norvegica Smith, Stalk-eyed Crust. Atl. Coast North America etc., l. c. p. 89.
1885. Nyctiphanes » G. O. Sars, Norweg. North Atl. Exp. II, p. 12.

1886.	Nyctiphanes Norvegica	Koelbel, Crust., Pycnog. und Arachn. von Jan Mayen etc., l. c. p. 48, taf. III, fig. 7—10.
1892.	» norvegica	Norman, Families Lophogastridæ and Euphausiidæ etc., l. c. p. 459.
1892.	» »	Stebbing, Hist. Crustacea, l. c. p. 263.

Localities:

in 1898:

stat. 41. lat. 75° 58′ N., long. 13° 18′ E., 56 miles S.W. of South Cape, Spitzbergen, depth 350 m., bottom temp. + 2,73° C., grayish clay, 1/IX, one spec.

in 1899:

stat. 3. lat. 63° 36′ N., long. 0° 26′ E., depth 1900 m., 2/VI., many spec.

in 1900:

stat. 21. East Greenland, off Kaiser Franz Joseph Fiord between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, one spec.
» 29. lat. 72° 42′ N., long. 14° 49′ W., between Greenland and Jan Mayen, depth 2000 m., clay, 27/VIII, many spec.
» II. lat. 73° 30′ N., long. 2° W., depth 1500—0 m., vertical net, 13/VII, one spec.

Distribution: This beautiful species seems to be widely distributed both in the North Atlantic Ocean and in the adjacent parts of the Arctic. It has been obtained during the »Porcupine« Expedition off the coast of Portugal. Norman mentions it from the Bay of Biscay and from the British Isles, and Sars from the whole of the Norwegian coast, where it occurs, in some localities, at the surface, in such vast swarms that the sea gets thereby a peculiar brownish tint. Smith states the same fact on the east coast of New England and Nova Scotia, where it goes as far south as Massachusetts Bay. Buchholz and Hansen enumerate it from the sea E. of Greenland, Koelbel from Jan Mayen, and Goës from Bohuslän and lat. 75° N., long. 12° E. It also occurs in Færöe Channel (Murray *fide* Norman) and off the Naze (Metzger). Sars reports it from the North Polar Basin, where it was taken during the famous »Fram« Expedition.

Strangely enough, it was not obtained either on the Challenger Expedition or on the German Plankton Expedition.

G. O. SARS says[1]: »May be the British form, *Thysanopoda Couchii*, observed by BELL, is identical with the present species.» NORMAN has, however, clearly proved that *Nyctiphanes Couchii* is a very distinct species, nearly related to *Nyctiphanes australis* G. O. SARS from Bass' Strait, Australia.

Length 37 mm.

Rhoda SIM 1872.

(= Boreophausia G. O. SARS 1883).

STEBBING is the first who, in his »History of Crustacea», pointed out that two Northern Euphausiids, viz. the well-known *Thysanopoda inermis* KRÖYER and a closely-allied form *Thysanopoda Raschii* M. SARS, ought strictly to be referred to the genus *Rhoda*, established in 1872 by G. SIM in his paper on »Stalk-eyed Crustacea N. E. Coast of Scotland», published in »the Scottish Naturalist». The genus was created to receive a species, viz. *Rhoda Jardineana*, which NORMAN identifies with *Thysanopoda Raschii*. SARS, in his »Preliminary Notices on the Schizopoda of H. M. S. »Challenger» Expedition», established for KRÖYER'S *Thysanopoda inermis* a new genus, viz. *Boreophausia*, but without giving any generic diagnosis. Two years afterwards he added[2] to this genus *Thysanopoda neglecta* KRÖYER and *Thysanopoda Raschii* M. SARS and, with some hesitation, *Thysanopoda longicaudata* KRÖYER. Of these species, *Thysanopoda Raschii* is the only one that ought properly to be referred to *Boreophausia*, the other two belonging, according to HANSEN and NORMAN, to the genus *Thysanoëssa*, established by BRANDT in 1851. Since *Rhoda Jardineana* has proved to be identical with *Boreophausia Raschii*, SARS' genus must yield priority to the much older name *Rhoda*. The genus thus includes *Rhoda inermis* (KRÖYER) and *Rhoda Raschii*(M. SARS).

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[1] l. c. p. 12.

[2] Norweg. North Atlant. Exp. II, p. 13. Rep. Challenger Exp., p. 64.

26. **Rhoda inermis** (KRÖYER).

1846. Thysanopoda inermis KRÖYER, Voy. in Scand. etc., p. 7, fig. 2 a—t.
1859. » » KRÖYER, Monograph, Fremstilling of Sergestes, l. c. p. 294, tab. V, fig. 24.
1879. » » SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 91.
1882. Euphausia » G. O. SARS, Overs. Norges Crust. etc., l. c. p. 51, tab. I, fig. 15.
1886. » » KOELBEL, Crust., Pycnog. und Arachn. von Jan Mayen etc., l. c., p. 47.
1887. Boreophausia » HANSEN, Ofv. vestl. Grönlands Fauna etc., l. c. p. 53.
1887. » » HANSEN, Dijmphna-Togtets zool. bot. Udbytte etc., l. c. p. 253, tab. XXIII, fig. 3.
1892. » » NORMAN, Families Lophogastridæ and Euphausiidæ etc., l. c. p. 461.
1893. [Boreophausia] Rhoda inermis STEBBING, Hist. Crustacea, l. c. p. 263.
1900. Rhoda inermis STEBBING, Arctic Crustacea, l. c. p. 11.

Localities:

in 1899:

stat. 3. lat. 63° 36′ N., long. 0° 26′ E., depth 1900 m., 2/VI, four spec. (together with *Nyctiphanes norvegica*).
» 26. lat. 72° 26′ N., long. 21° 48′ W., depth 180—0 m., vertical net, 24/VII, three spec.
» 27. lat. 71° 35′ N., long. 21° 10′ W., depth 200—0 m., vertical net, 27/VII, three spec.
» 43. lat. 73° 32′ N., long. 24° 38′ W., Kaiser Franz Joseph Fiord, Cape Weber, depth 100—110 m., mud with gravels and stones, 28/VIII, one spec.

in 1900:

West Spitzbergen, entrance of King's Bay, depth 300—0 m., trawl, 2/VII, many spec.
stat. 16. lat. 72° 25′ N., long. 17° 56′ W., E. of Greenland, depth 300 m., stones and sand, 30/VII, one spec.
» 21. East Greenland, off Kaiser Franz Joseph Fiord, between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, several spec.
» 29. lat. 72° 42′ N., long. 14° 49′ W., between Greenland and Jan Mayen, clay, depth 2000 m., 27/VIII, three spec.

Rhoda inermis has more or less the same distribution as the preceding species, which it rivals also in number of specimens. It is restricted to the boreal parts of the North Atlantic and its continuation northwards. It occurs off the British Isles, West- and North-Norway, Kara Sea, Spitzbergen, Jan Mayen, East- and West-Greenland, and the coast of New England as far south as Vineyard Sound and Massachusetts Bay.

It does not attain such a size as *Nyctiphanes norvegica.* My largest specimen measured 29 mm.

Thysanoëssa BRANDT 1851.

This genus was established by BRANDT in MIDDENDORFF'S Sibirische Reise with the following diagnosis. Pedum maxillarium par externum reliquis pedibus longius. It included *Thysanopoda* (*Thysanoëssa*) *longipes* BRANDT which has proved to be identical with *Thysanopoda neglecta* KRÖYER. Another species figured but not described by KRÖYER, in »Voyage en Scandinavie etc.», is also referred to this genus, viz., *Thysanopoda longicaudata.* In 1882 SARS described two more species from the coasts of Norway, viz. *Thysanoëssa borealis* and *Thysanoëssa tenera*, but HANSEN, who has examined KRÖYER'S type-specimens, preserved in the Museum of Copenhagen, comes to the conclusion that *Thysanoëssa borealis* must be identified with *Thysanopoda neglecta*, and *Thysanoëssa tenera* with *Thysanopoda longicaudata.* In the »Challenger reports», SARS has added two new species to the genus, viz. the cosmopolitan *Thysanoëssa gregaria* and *Thysanoëssa macrura* from the Antarctic and South Atlantic Oceans. The genus which is closely allied to *Nematoscelis* G. O. SARS and *Stylocheiron* G. O. SARS is, in its present restriction, distinguishable, according to SARS, by the following characteristics: first pair of legs greatly produced and rather strong, the two last joints armed with spiniform bristles on both margins.

During the Swedish Arctic Expeditions of the last three summers only the following species was obtained, viz.

27. **Thysanoëssa longicaudata** (KRÖYER).

1846.	Thysanopoda	longicaudata	KRÖYER, Voy. en Scand. etc., l. c p. 7, fig. 1 a—f.
1882.	Thysanoëssa	tenera G. O.	SARS, Ofv. Norges Crust. etc., l. c p. 53, tab. I, fig. 19—20.
1887.	»	longicaudata	HANSEN, Ofv. vestl. Grönl. Fauna etc., l. c. p. 54.
1892.	»	»	NORMAN, Lophogastridæ and Euphausiidæ etc., l. c. p. 463.
1893.	»	»	STEBBING, Hist. Crustacea etc., l. c. p. 265.
1893.	»	»	ORTMANN, Decapoden und Schizopoden d. Plankton-Exp., l. c. p. 14.
1900.	»	»	SARS, Norweg. North Polar Exp. 1893—1896. Crustacea, p. 14.

Locality:

in 1900:

II. lat. 73° 30′ N., long. 2° W., depth 1500—0 m., vertical net, 13/VII, one spec.

This species has been obtained off the Western and Northern coasts of Norway, off Scotland, in the Færöe Channel, off Greenland ('Valorous' Exp. *fide* NORMAN), in the North Polar Basin, in the sea between Norway and Jan Mayen, and at several stations of the German Plankton Expedition situated resp. in the areas of the Gulf Stream, the Irminger Sea, the West Greenland Current, and the Labrador Current. KRÖYER's type specimens are from lat. 61° N., long. 13° W., and from lat. 60° N., long. 11° W. The main distribution of this species seems, therefore, to be, the Arctic parts of the North Atlantic.

Length: 15,5 mm.

Fam. Mysidæ.

Boreomysis G. O. SARS 1869.

This genus was instituted in 1869 by G. O SARS in his Undersogelser over Christianiafjordens Dybvandsfauna, to receive *Mysis arctica* KRÖYER, which, at that time, was only known from a single specimen from Greenland. Later on, in his classical »Monographi over de ved Norges Kyster forekommende Mysider», III. 1879, the same author gave a full diagnosis of the genus. He considers the structure of the marsupium in the female as its most distinctive feature, this being here composed of seven pairs of lamellæ, whilst, in all other Mysideans, it is formed by three pairs at the utmost.

Petalophthalmus WILLEMOES-SUHM is the only one that shares that characteristic with *Boreomysis*. Besides that, the structure of thep leopods in the male being all natatory, with very elongate branches, and the rudimentary auditory apparatus make the genus very distinct. In the same genus he included two other species also occurring in the deepest parts 100—400 fathoms of the Norwegian Fiords, viz., *Boreomysis tridens* G. O. SARS, and *Boreomysis megalops* G. O. SARS. On the Norwegian North Atlantic Expedition were obtained the two species to be mentioned below; and, in his report on the Challenger Schizopoda, SARS added two more species to the genus, viz. *Boreomysis obtusata* and *Boreomysis microps* from the North Pacific and North Atlantic resp., both from considerable depths. Thus the genus comprises, at present, seven species, all of which are probably bathypelagic forms.

28. **Boreomysis nobilis** G. O. SARS.

Fig. 3.

1879. Boreomysis nobilis G. O. SARS, Crust. et Pycnogon. nova etc., l. c. p. 428.
1885. » » G. O. SARS, Norweg. North Atl. Exp. I, p. 54, pl. 5, fig. 22—28.
1887. » » HANSEN, Ofv. vestl. Grönlands Fauna etc., l. c. p. 214.

Localities:

in 1900:

stat. 21. East Greenland, off Kaiser Franz Joseph Fiord between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, several spec.
» 25. East Greenland, entrance of Kaiser Franz Joseph Fiord, depth 200—300 m., mud, 14/VIII, three spec.

The species was described after a single specimen (a male) obtained during the Norwegian North Atlantic Expedition in lat. 79° 59′ N., long. 5° 40′ E. from a depth of 839 metres. Two other localities are recorded by HANSEN for this species, viz. lat. 69° 15′ N., long. 52° 55′ W., and lat. 75° 26′ N., long. 67° 27′ W., both, thus, situated, in the northern part of Baffin Bay. The depths were 265 and 260 fathoms resp. I have not been able to find any other records of its occurrence. It may, therefore, be regarded as an inhabitant of the deep-sea of the Atlantic part of the Arctic Ocean.

The oral parts do not deviate from the structure, which is to be found in the type species, viz. *Boreomysis arctica* (KRÖYER) as described and figured by SARS in his »Carcinologiske Bidrag». The molar part of the mandible, the maxillæ and the maxillipeds closely agree with the corresponding parts in the said species, but deviate more from those in the following species. The last joint of the palp of the mandible slightly deviates as may be seen by comparing SARS' and my own figures of it. As SARS' specimen of *Boreomysis nobilis* had the uropoda somewhat mutilated, I give herewith a figure of them.

Length of largest male 45 mm.
» » » female 49 mm.

29. **Boreomysis scyphops** G. O. SARS.

Petalophthalmus inermis WILLEMOES-SUHM MS.

1879. Boreomysis scyphops G. O. SARS, Crust. et Pycnogon. nova etc., l. c. p. 429.
1884. » » G. O. SARS, Prelimin. Not. Schizop. Chall. Exp., l. c. p. 34.
1885. » » G. O. SARS, Norweg. North Atl. Exp. I., p. 56, pl. 6.
1885. » » G. O. SARS, Schizopoda, Chall. Rep., l. c. p. 178, pl. XXXII, fig. 10—20.

Localities:

in 1898:

stat. 26. lat. 78° 19′ N., long. 8° 41′ E., »Swedish Depth», depth 2700 m., bottom temp. — 1,4° C., Biloculina clay, 25/VII, six spec. (more or less mutilated).
» 27. lat. 77° 52′ N., long. 3° 5′ W., 40 miles S.W. of the »Swedish Depth», depth 2750 m., bottom temp. — 1,4° C., Biloculina clay, 29/VII, two spec.

in 1900:

stat. 29. lat. 72 42′ N., long. 14° 49′ W., between Greenland and Jan Mayen, depth 2000 m., clay with foraminifers, 27/VIII, many spec.

This easily-recognizable form was, for the first time, recorded by the late WILLEMOES-SUHM who referred it to *Petalophthalmus* on account of the resemblance, in respect to the rudimentary eyes, between this species and *Petalophthalmus armiger* — also obtained at a very considerable depth during the Challenger Expedition and described by the same distinguished zoologist. On the Norwegian North Atlantic Expedition the same species was also trawled, described, and figured by SARS, who, after the working-up of the material of Challenger Schizopoda, was not able to find any differences between the Arctic and Antartic specimens. He also proved that the species must be referred to *Boreomysis*, and, in his Challenger Report, he explains the reasons why he thinks it inadvisable to adopt WILLEMOES SUHM's specific name, although it can justly claim priority.

Besides its very striking peculiarities in structure, this species is also of the utmost interest with regard to its geographical distribution. Up to now it has been obtained at three stations on the Challenger Expedition between lat. 46° 16 S. and lat. 53° 55′ S. on the one side, and between long. 48° 27′ E. and long. 123° 4′ E. on the other, the depths varying from 1600 to 1950 fathoms. During the Norwegian North Atlantic Expedition it was obtained at lat. 71° 59′ N., long. 11° 40′ E. from a depth of 1110 fnthoms. These are, as yet, the only localities recorded for this species, besides those enumerated by me from the last Swedish expeditions. But it has hitherto been obtained in no other place in the intermediate tropical seas. Thus, it seems to be a »bipolar» form, to which animals two other *Schizopoda* may also belong, viz. the Arctic *Lophogaster typicus* M. SARS, obtained by the »Challenger» at two stations south of the Cape of Good Hope and *Amblyops Crozetii* WILLEMOES-SUHM represented in the Challenger collection by a single specimen from Crozet Island, and now rediscovered in the Arctic Ocean by the Swedish Expedition of 1900 (*vide infra*). The explanation of such strange occurences belongs, without doubt, to the most interesting problems yet to be solved by zoogeographers, but, I think, we shall have to wait a long time, before this intricate question can be satisfactorily settled.

Sars' descriptions of the species are so exhaustive that I have nothing to add to them. Specimens preserved in a mixture of formol and alcohol still exhibit the bright red colour of the body. The eyescales, the carapace, the antennæ and the legs are whitish.

Length of greatest specimen (a female) 62 mm.

or from the tip of the antennal scale to that of the uropod 78 mm.

The largest specimen which Sars measured in this way was 85 mm. long. It was obtained in the Southern Ocean.

Amblyops G. O. Sars 1872.

Amblyopsis G. O. Sars, 1869 (preoccupied).

This genus was first brought to the notice of the scientific world in 1869 by G. O. Sars, in his »Undersøgelser over Christianiafjordens Dybvandsfauna», to receive a Mysidean closely allied to *Pseudomma*, and first mentioned in 1868 by the great Norwegian carcinologist's illustrious father in his »Fortsatte Bemærkninger over det dyriske Livs Utbredning i Havets Dybder»[1] under the name of *Pseudomma abbreviatum* G. O. Sars. In Heft 2 of his »Carcinologiske Bidrag til Norges Fauna G. O. Sars has more fully described and figured this species, which was obtained by him in depths ranging from 100 up to 300 fathoms at several places on the coast of Norway. e. g. off Lofoten, in the Hardanger- and Christiania-Fiords. The same author afterwards added to this genus, in his report on the Challenger Schizopoda, another form from the Southern Ocean off Crozet Islands, of which species, however, only a single specimen — an adult male — was obtained. To my great surprise, I rediscovered five specimens, viz. four males and one female, of this species from a station of the Swedish Arctic Expedition, 1900, together with a number of the bathypelagic *Boreomysis scyphops*. I am unable to detect any differences whatever between the Southern and Northern form, so that I must consider them as being absolutely identical. In a short notice on »A new »bipolar» Schizopod», published in the Ann. Mag. Nat. Hist. for this year (Ser. 7, Vol. VII, p. 371), I have pointed out the great geographical interest which is connected with this find. As I have also one female at my disposal, I am here able to complete SARS' description.

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[1] Forh. Vid. Selsk. Christiania, Aar 1868, p. 262.

I refer to this genus another very characteristic form brought home by the same expedition, although it deviates from it in some points.

30. **Amblyops Crozetii** WILLEMOES-SUHM. MS.

Amblyops crozetii WILLEMOES-SUHM M. S.
1884. » » G. O. SARS, Prelim. Not. Schizopoda »Challenger» Exp., l. c. p. 36.
1885. » » G. O. SARS, Schizopoda, Chall. Rep., l. c. p. 186, pl. XXXIII, fig. 11—16.

Locality:

in 1900:

stat. 29. lat. 72° 42′ N., long. 14° 49′ W., between Greenland and Jan Mayen, depth 2000 m., clay with foraminifers, 27/VIII, five spec. (4 ♂, 1 ♀).

In general appearance and in nearly all details my specimens perfectly agree with the description and figures given by SARS in the »Challenger» Report. I am only able to find very slight differences in a few respects. Thus, the insinuation of the end of the telson is, in the Northern specimens, a little more pronounced, and the antero-lateral corners of the eye-scales more rounded.

In the structure of the oral parts this species closely resembles *Amblyops abbreviata*. There are, however, a few differences of minor importance: the third joint of the palp of the mandible is relatively longer than in last species; also the last joint of the second pair of maxillæ is, along its exterior margin, provided with 12 ciliated bristles instead of six, as SARS mentions for *A. abbreviata*. The basal joint of the first pair of maxillipeds has at its extremity a similar prominence as in this species. Last joint (with the claw) of the second pair of maxillipeds is of more than half the length of the preceding joint. In *A. abbreviata* it is much shorter. Pereiopods and pleopods of the usual structure.

As mentioned above, a single specimen of *Amblyops Crozetii* was taken in the Southern Ocean off Crozet Islands in lat. 46° 16′ S., long. 48° 27′ E. at a depth of 1600 fathoms. The find of it in the Arctic Ocean was, therefore, very surprising and seems, in my opinion, to corroborate the view of Chun that a communication of animals still exists in the deeper or abyssal strata of the oceans between the Arctic and Antarctic seas. However, further researches in the far Southern Ocean afford the only means of fully settling the interesting problem of »bipolarity».

Length of male: 26 mm., of female 25 mm.

31. **Amblyops Sarsii** n. sp.

Fig. 4.

Carapace submembranaceous, covering whole pereion except the hindmost segment. Sixth segment of pleon as long as the three preceding ones. The anterior, or cephalic, part of the carapace is marked off by a distinct sulcus and arched above. The frontal margin ends in an angle, which, seen *en profile*, seems to form a short, somewhat upturned rostrum. The antero-lateral corners evenly rounded.

The eye-scales, or ocular plates, as compared with those in the other species of the genus, rather small, not contiguous, with a free space between them. They are of an almost quadrate form, with a sharp line running along the lateral side. The upper side with a short styliform process visible from above and from the medial side. The anterior-inferior margin is rounded off.

The peduncular joints of the antennulæ very large, short and thick, especially the last one, which is as long as the two proximal ones, but broader. An oblique, broad band of dark-brown pigment-spots is on the upper side of the third joint, which gives it a somewhat strange appearance. As the distal part was broken off, it was impossible to make out the exact form of the antennal scale. The non-setous part of the exterior margin reaches in all cases to the root of the flagellum. The three distal peduncular joints rather large, nearly quadrate, of about the same size.

Second joint of the flagellum of the mandible relatively broader than in *Amblyops abbreviata* and third joint longer, in fact nearly as long as preceding joint.

Maxillulæ and *maxillæ* as in type species. *Maxilliped* relatively shorter and broader, its third joint more broad than long, fourth a little longer than fifth, which is nearly as broad as long.

First pair of legs (gnathopod or second pair of maxilliped) much longer than maxilliped (in *Amblyops abbreviata* scarcely longer) and of a very slender form.

Second pair of legs with *unguis* slender, and nearly as long as preceding articulation.

Three pairs of incubatory lamellæ, the first of which, as usual, much the smallest.

Telson half as long as sixth joint of pleon, of an oblong-lanceolate form, nearly as in the type-species, the distal half of the lateral margins fringed with short setæ. Apex narrowly rounded.

The inner plates of the *uropoda*, twice as long as telson, of the usual lanceolate, form, auditory apparatus well developed, although small. The relative length of the inner and outer plates could not be ascertained, as the distal part of the exterior one was broken off.

Length: 17 mm.

Locality:

in 1900:

Spitzbergen, Ice Fiord, Coal Bay, depth 50 m., stones and dead shells. 16/VI—20/VI. one spec., female.

Pseudomma G. O. Sars 1869.

In his paper on »Nye Dybvandscrustaceer fra Lofoten», G. O. Sars introduced in the science a new genus of *Schizopoda* closely allied to *Amblyops*, but differing from that genus in having coalesced eye-plates and more slender pereiopods without any unguiform terminal joint. The species mentioned below was described as the type of the genus. Another species, *Pseudomma affine*, was also for the first time recorded in the same memoir. In 1879, SMITH farther enlarged the genus with *Pseudomma truncatum* from the Gulf of St. Lawrence, and, in his Challenger Report, SARS described two new species, viz. *Pseudomma Sarsii* WILLEMOES-SUHM M.S. and *Pseudomma australe*; the former was dredged off Kerguelen Islands and at a station as far south as lat. 65° 42′ S., and the latter in Bass Strait.[1] To these I am here going to add a new form collected in the course of the Swedish Arctic Expedition 1900. The genus will, therefore, comprise five northern and two southern species.

Although the genus, without doubt, must be regarded as of abyssal origin, it is worth while remarking that *Pseudomma australe* was obtained at a depth of 33 fathoms and *Pseudomma truncatum* once at a depth of 45 fathoms.

32. **Pseudomma roseum** G. O. SARS.

1870.	Pseudomma roseum	G. O. SARS, Nye Dybvandscrustaceer fra Lofoten, l. c. p. 154.
1870.	» »	G. O. SARS, Carcinol. Bidrag til Norges Fauna etc., I. l. c. p. 54, tab. IV.
1879.	» »	SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 98.

Localities:

in 1900:

stat. 18. lat. 74° 30′ N., long. 18° 40′ W., East Greenland, S.E. of Walrus Island, depth 80—100 m., mud and stones, 4/VIII, two spec. (♀).

21. East Greenland, off Kaiser Franz Joseph Fiord and Mackenzie Bay, depth 250 m., mud, 8/VIII, twelfe spec. (4♂, 8♀).

27. East Greenland, Kaiser Franz Joseph Fiord, Muskox-Fiord, depth 220 m., clay, 21/VIII, three spec. (♀).

This pretty Mysidean was first discovered by SARS off Lofoten Islands, where, in some places, it was rather abundant. It was afterwards obtained in the Hardanger Fiord, and by the Norwegian North Atlantic Expedition, at one station off the West coast of Norway, and at another S.W. of Jan Mayen. METZGER mentions it from Skagerack SW. of Lindesnäs, and SMITH from Gulf of Maine and Gulf of St. Lawrence. It was also obtained at Matotschkin Schar (STUXBERG). It must, therefore, be regarded as belonging to the cold area of the North Atlantic.

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[1] In the »Fauna und Flora Grönlands», l. c. p. 200. VANHOEFFEN shortly described another species, viz. *Pseudomma parvum*, but without giving any details or figures at all.

It ranges vertically from 60—70 fathoms (Matotschkin Schar) up to 400—500 fathoms (Hardanger Fiord).

Length of largest male 24 mm.
» » » female 28 mm.

33. **Pseudomma Théeli** n. sp.

Fig. 5.

Eye-scales quite coalesced, non-serrated, without any trace of a median fissure, seen from above representing an equilateral triangle, the lateral sides of which are somewhat sinuated. Antennal scale relatively much longer than in the other species, five times as long as they are broad, its outer margin terminating, as usual, in a strong spine, which, however, is situated, contrary to what is the case in the other known species, at the apex of the scale. In this respect it comes nearest to *Pseudomma Sarsii* WILLEMOES-SUHM, and is farthest remote from *Pseudomma australe*, in which this spine is situated very near the base of the scale. *Pseudomma Théeli* and *Pseudomma australe* thus represent the extreme poles in regard to the relative length of the outer margin as compared with the inner setous one, the other species being intermediate links in the series.

Telson is also of a very different appearance than in the allied species. It is very long and narrow, with the lateral sides a little sinuated. It is five times as long as it is broad (at the apex). This is subtruncated, armed with 10 strong spines, the median ones being as long as the apex is broad. Only three or four very small lateral spines are on each side above the apical ones. I was not able to detect any trace of the median pair of slender plumose setæ which occurs in the other species.

In the general appearance *Pseudomma Théeli* resembles the type species, viz. *Pseudomma roseum* In the structure of the oral parts there are some deviations to be found in the form of the two distal joints of the palp of the mandible, the third one being triangular, with the apex very broad. The maxillipeds and the first pair of pereiopods, the gnathopods, are also relatively much shorter and thicker than in *Pseudomma roseum*, as may be seen by comparing my figures with those given by SARS in his »Carcinologiske Bidrag», I, tab. IV, fig. 11, 12.

Locality:

in 1900:

stat. 27. East Greenland, Franz Joseph Fiord, entrance of Musk-ox Fiord depth 220 m., mud, 21/VIII, two spec. (females, the one very mutilated, without pleon and the half of the pereion).

Length 20 mm.

Erythrops G. O. SARS 1869.

Nematopus G. O. SARS (preoccupied).

In the year 1863, G. O. SARS, in his »Beretning om en i Sommeren 1862 foretagen zoologisk Reise i Christianias og Trondhjems Stifter», has described two new Mysideans for which he created a new genus, *Nematopus*. Next year he added two other species, and also referred to it *Mysis erythrophthalma* described by GOËS nearly at the same time. Then, in his most important paper, especially with regard to *Schizopoda*, viz. »Undersögelser over Christianiafjordens Dybvandsfauna», he enlarges the genus with a new species, but, at the same time, changed the generic name into *Erythrops*, the old name being preoccupied. For one, of the former species he also instituted a new genus, viz. *Parerythrops* to indicate the close relationship with the typical genus. In his »Monographi over de ved Norges Kyster forekommande Mysider», the genus was thus made to include the following species: *Erythrops Goësii* (= *Mysis erythrophthalma* GOËS), *Erythrops serrata*, *Erythrops microphthalma* (= *Nematopus microps*), *Erythrops pygmæa* (= *Nematopus elegans*), *Erythrops abyssorum*. Another species was described in his report on the crustaceans of the Norwegian North Atlantic Expedition, viz. *Ery-*

throps glacialis. It is worth remarking that no representative of this genus was obtained either on the Challenger Expedition or on the German Plankton Expedition. These species, all of which, when living, are very easily recognizable by their bright red eye-pigment soluble in spirit, have hitherto only been recorded from the North Atlantic and Arctic Oceans; *Erythrops pygmæa* also occurs in the Mediterranean at Messina and Naples (G. O. SARS), and, as SARS has pointed out, they are certainly of an Arctic origin only occurring along the Norwegian coast in the innermost and deepest basins of the fiords, as also many other animals of undoubtedly Arctic origin.

34. **Erythrops Goësii** (G. O. SARS).

1864.	Mysis erythrophthalma		GOËS, Crust. decapoda marina Sueciæ etc., l. c. p. 174.
1868.	Nematopus Goësii		G. O. SARS, Beretn. om en i Sommeren 1865 foretagen zool. Reise etc., l. c. p. 96.
1870.	Erythrops	»	G. O. SARS, Carcinol. Bidrag til Norges Fauna etc., I., l. c. p. 24, tab. I.
1892.	»	»	NORMAN, British Mysidæ etc., l. c. p. 160.

Locality:

in 1898:

stat. 21. lat. 78° 27′ N., long. 15° 20′ E., Ice Fiord, North Fiord, depth 175 m., soft brownish clay. 19/VII, one spec.

This species, the type of the genus, was found by LOVÉN off Finmarken, by LILLJEBORG at Christiansund, and by the Swedish Expedition, in 1861, in Wide Bay, North Spitzbergen. Later on, it was rediscovered by SARS at several places off the Norwegian coast from Hammerfest to Christiania Fiord. It also occurs off Scotland, in the Firth of Forth (SCOTT). SMITH mentions it from Massachusetts Bay, and STUXBERG and JARZYNSKY from the White Sea, Murman Coast, Matotschkin Schar, and Kara Sea. VANHÖFFEN enumerates it in his list of crustaceans obtained in Karajok Fiord, West Greenland. Along the Norwegian coast it occurs in depths ranging from 30 up to 100 or 125 fathoms, and seems to live exclusively on muddy bottom.

Farther north it dwells in shallower depths. In Murman Sea it was once dredged at a depth of only 10 fathoms.

Length of my spec. (a male) 15 mm.

35. **Erythrops abyssorum** G. O. SARS.

1869.	Erythrops abyssorum	G. O. SARS, Undersøg. over Christiania fiordens Dybvandsfauna, l. c. p. 326.
1870.	» »	G. O. SARS, Carcinol. Bidrag til Norges Fauna etc., l. c. p. 36. tab. V, fig. 1—12.

Localities:

in 1899:

stat. 25. lat. 72° 28′ N., long. 21° 48′ W., depth 180 m., muddy bottom, some stones, 24/VII, one spec.

in 1900:

stat, 16. lat. 72° 25′ N., long. 17° 56′ W., E. of Greenland, depth 300 m., stones and sand, 30/VII, four spec.

This species, which is closely allied to *Erythrops serrata* G. O. SARS, was first discovered by the great Norwegian carcinologist in great abundance in an isolated deep basin off the exterior part of the Christiania Fiord where it occurred on muddy bottom, in depths ranging from 150 to 230 fathoms. There it was living together with *Munnopsis typica*, *Eurycope cornuta*, and other Arctic crustaceans. Afterwards it was observed off Lofoten Islands, and, on the Norwegian North Atlantic Expedition, in the Porsanger Fiord, and also off Jan Mayen. It was, moreover, obtained during the Dijmphna Expedition at four stations in the Kara Sea. It was also obtained by VANHÖFFEN in Karajok Fiord, West Greenland. Its occurence off East Greenland, together with the finds of it mentioned above, thus attest its Arctic origin. In the Arctic Ocean it seems to live in shallower water, e. g., in the Kara Sea, it was taken at a depth of 51 fathoms.

As SARS has shown, this species is subject to some variations in the size of the eyes and the length of the pereiopods. The deeper the water in which it lives, the smaller become the eyes; and, on muddy bottom, the legs aer always longer than in specimens living on more firm and compact bottom. This interesting fact, viz., the modifying influence of the bottom on the length of the pereiopods, the same author also states with regard to the other species of the genus. *Erythrops pygmæa*, which dwells very often on sandy bottom, has also relatively the shortest legs, whilst *Erythrops serrata* and *Erythrops microphthalma*, living always on muddy bottom, are provided with the longest ones. Now, Sars points out this interesting fact to be observed even in the same species.

Of my specimens, three were males and two females.

Length of larest male 18 mm.
" " » female 15,5 mm.

36. **Erythrops glacialis** G. O. Sars.

1877. Erythrops glacialis G. O. Sars, Prodr. descript. Crust. etc., l. c. p. 242.
1885. » » G. O. Sars, Norw. North. Atl. Exp. I, p. 45, pl. 5, fig. 1—4.

Locality:

in 1900:

stat. 21. East Greenland, off Kaiser Franz Joseph Fiord, between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, one spec.

This species was obtained in two specimens during the Norwegian North Atlantic Expedition in the open sea off the coast of Norway at two stations. Both belong to the cold area, and the depths were 498 and 350 fathoms resp. As it has now been found also off East Greenland, Sars is, no doubt, right in suggesting that it may unquestionably be regarded as a true Arctic form.

My specimen was a male with well developed pleopods of the typical biramous appearance. In no detail, did it deviate from the description and figures which Sars has given of it in the work cited above.

Length: 17 mm.

Parerythrops G. O. Sars. 1869.

Among the species belonging to *Nematopus* (*Erythrops*), G. O. Sars described, in 1864, one species which deviated so much in some points of its structure, that the author, even at that time, only with great hesitation included it in the genus. Having afterwards discovered some other species all agreeing with each other, but deviating from *Nematopus obesus*, he established then in 1869, in his »Undersøgelser over Christianiafjordens Dybvandsfauna» a new genus, viz. *Parerythrops*, for this species. Two other species, viz. *Parerythrops abyssicola* from the deep basins of the Sogne Fiord, and *Parerythrops spectabilis* from two stations of the Norwegian North Atlantic Expedition, were then, in 1877, shortly described by the some author. To the same genus is now generally referred another species described, from the coasts of New England in 1879, by Smith as *Meterythrops robusta*.

As the preceding genus, this includes also deep sea forms of an undoubtedly Arctic origin. Up to now the genus has not been met with in other seas except in the cold area of the North Atlantic and in the Arctic Ocean.

37. **Parerythrops robusta** (Smith).

1879.	Meterythrops robusta	SMITH, Stalk-eyed Crust. Atl. Coast North America, l. c. p. 93, pl. XII, fig. 1, 2.
1879.	Parerythrops »	G. O. SARS, Carcinol. Bidrag til Norges Fauna etc., l. c. III, p. 98, tab. XXXIX.

Locality:

in 1900:

stat. 19. lat. 74° 35′ N., long. 18° 15′ W., East Greenland, S.E. of Pendulum Island, depth 150 m., mud and stones, 5/VIII, seven spec. (4 ♂, 3 ♀).

This species was first observed in Massachusetts Bay and in the Gulf of S:t Lawrence by the late distinguished carcinologist Prof. Smith, who proposed a new genus for it, mainly on account of the different structure of the first pair of pleopods in the male, the endopodite being here rudimentary, soft, and membranaceous. Meanwhile, it was found by SARS at Bodö and in the Varanger Fiord, and, on the Norwegian North Atlantic Expedition, in the Porsanger Fiord, and off South Cape, Spitzbergen. SARS does not regard the deviating form of the endopodite of the first pair of male pleopods as of generic value; but, as the species in all other points closely agrees with the other known species of *Parerythrops*, he includes it in this genus.

It also occurs in the Kara Sea (Dijmphna Expedition) and off East Greenland (Swed. Arct. Exp. 1900). It must, therefore, be considered as decidedly Arctic, but as to how far SARS is right in supposing it also to be circumpolar is a detail which must be left to future researches to prove.

It ranges bathymetrically from 33 up to 150 fathoms. It lives mainly on muddy bottom, sometimes mixed with sand.

Length of largest		male.	23	mm.
»	»	» female	21	».

One of the females in my collection had in the marsupium six eggs of rather large size. The cleavage was finished, but the formation of the embryo had not yet begun. In the other two females the marsupium contained about twenty young ones, most of which were of a length of 4 mm.

38. **Parerythrops spectabilis** G. O. SARS.

1877. Parerythrops spectabilis G. O. SARS, Prodr. descript. Crust. etc., l. c. p. 243.
1885. » » G. O. SARS, Norweg. North Atl. Exp. I, p. 47, pl. 5, fig. 5—12.

Localities:

in 1899:

stat. 18. lat. 74° 52′ N., long. 17° 16′ W., depth 350 m., muddy clay, sand and pebbles, 4/VII, one spec. (♂).

in 1900:

stat 21. East Greenland between Bontekoe Island and Mackenzie Bay, depth 250 m., mud, 8/VIII, several spec. (15♂, 12♀).

This species, which is distinguishable by its considerable size, the its eyes, and the armature of the apex of telson, was obtained during the Norwegian North Atlantic Expedition at two stations far distant from each other, but both belonging to the cold area, the one being situated off Storeggen NW. off Cape Stadt and the other SW. of Jan Mayen. It also occurs off West Greenland, Karajok Fiord (Vanhöffen).

Its vertical range is from 250 up to 763 metres, and it is undoubtedly of Arctic origin.

Length of largest male . . . . . 23 mm.
» » » female . . . . 20 » .

Mysideis G. O. Sars 1869.

In his »Undersøgelser over Christianiafjordens Dybvandsfauna», Sars established this genus to receive a Mysidean obtained by him at great depths in the Christiania Fiord, and first named *Mysis insignis* by the same author in »Beretning om en i Sommeren 1863 foretagen zoologisk Reise i Christiania Stift». The genus comes nearest to *Mysidopsis*, although deviating from that genus in the structure of mandibles and of the second pair of maxillæ. Sars added, then, to the genus in 1879, in the third part of his »Carcinologiske Bidrag til Norges Fauna», another form already described in 1863 by Goës as *Mysis grandis* and occurring rarely off the coasts of Finmarken and Spitzbergen.[1] No other species have as yet been described.

39. **Mysideis grandis** (Goës).

1864.	Mysis grandis	Goës, Crust. decap. podophth. mar. Sueciæ etc., l. c. p. 176.
1879.	Mysideis	G. O. Sars, Carcinol. Bidrag til Norges Fauna etc., III, p. 106, tab. XLI—XLII.
1892.	Stilomysis »	Norman, British Mysidæ etc., l. c. p. 148.
1900.	» »	Stebbing, Arctic Crustacea etc., l. c. p. 11.

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[1] In 1892, Norman made this the type of a new genus, for which he proposes the name *Stilomysis*, but without giving any detailed description of the genus. It seems to me very uncertain how far he is right in establishing this genus.

Localities:

in 1898:

stat. 39. lat. 79° 43′ N., long. 10° 52′ E., Danes' Island, Virgo's Harbour, depth 25—30 m., gray clay, Laminariæ, 27/VIII, one spec.

in 1900:

stat. 2. West Spitzbergen, Ice Fiord, Coal Bay, depth 100 m., rocks, 16/VI—20/VI, one spec. (♀).
3. ibidem, depth 50—100 m., stones, 12/VI, three spec. (2♂, 1♀).
5. ibidem, Green Harbour, depth 10—80 m., stones, 25/VI, one spec.
8. West Spitzbergen, Kings Bay, depth 10—30 m., stones and sand with Laminariæ, 29/VI, one spec. (♂).
19. East Greenland, S.E. of Pendulum Island, lat. 74° 35′ N., long. 18° 15′ W., depth 150 m., mud and stones, 5/VIII, three spec. (♀).
26. East Greenland, Franz Joseph Fiord, the innermost part of Muskox Fiord, depth 100 m., clay, 17/VIII, one spec. (♀).

This species was first obtained by the illustrious Swedish zoologist Lovén off the coast of Finmark where it was afterwards observed by Sars. It was described by Goës from specimens collected at Spitzbergen. Stebbing mentions it from the Barents Sea from lat. 70° 51′ N., long. 53° E. Hansen from West Greenland in lat. 65° 35′ N., long. 54° 50′ W. and Vanhöffen from Karajok Fiord. Its area of distribution has now, by the Swedish Arctic Expedition, been enlarged by the addition of East Greenland. Thus, it seems to belong ex clusively to the Atlantic part of the Arctic Ocean.

It ranges vertically from a few (5) up to 100 fathoms.

Length of largest spec. (a female from stat. 26) 39 mm.

Mysis Latreille 1803.

This genus, in its widest sense, comprises many species, but it has now been subdivided into several genera, mainly by Sars and Norman (l. c.). Latreille's original genus has been restricted by the last author to the species to be mentioned below and to the well-known fresh-water form *Mysis relicta* Lovén.

40. **Mysis oculata** (O. FABRICIUS).

1780. Cancer oculatus O. FABRICIUS, Fauna Groenlandica, p. 245, n. 222, Fig. 1. A—B.
1846. Mysis oculata KRÖYER, Voy. en Scand. etc., l. c., Pl. 8, Fig. 2 a—r, Fig. 3 a—f.
1861. » » KRÖYER, Mysidæ, l. c. p. 13.
1879. » » G. O. SARS. Carcinol. Bidr. etc., III. p. 69, Tab. XXXI.
1887. » » HANSEN, Dijmphna-Togtets zool. bot. Udbytte etc., l. c. p. 251, tab. XXIII, fig. 2—2 b.

Localities:

in 1898:

stat. 4. lat. 74° 21′ N., long. 19° 15′ E., Beeren Island, depth 14—18 m., rocky bottom with algæ, pebbles, and sand, 17/VI, one spec.
» 8. lat. 76° 50′ N., long. 17° 20′ E., Stor Fiord, depth 14—18 m., stony bottom with Laminariæ, 25/VI, two spec.
» 21. one spec.
» 29. lat. 78° 40′ N., long. 27° 10′ E., King Charles Land, Swedish Foreland, depth 14—16 m., bottom temp. + 0,9° C., soft, grayish-black, sand, stones, mud, and algæ, 5/VII, two spec.
» 30. King Charles Land, Swedish Foreland, depth 10—16 m., soft, grayish-black sand, stones, mud, and algæ, 6/VIII, many spec.
» 31. King Charles Land, Swedish Foreland, depth 12—20 m., soft, grayish-black clay, 8/VIII, many spec.
» 32. King Charles Land, Rivalen Sound, depth 100—110 m., bottom temp. — 1,45° C., soft clay with boulders, 8/VIII, one spec.
» 39. lat. 79° 43′ N., long. 10° 52′ E., Danes Island, Virgo's Harbour, depth 25—30 m., gray clay, Laminariæ, 27 VIII, two spec.

in 1899:

stat. 10. Jan Mayen, Mary Muss Bay, depth 7—9 m., sand and algæ, 19/VI, two spec.
» 29. lat. 70° 27′ N., long. 22° 35′ W., Scoresby Sound, Cape Stewart, depth 13—18 m., mud, stones, and algæ, 30/VII, two spec.
North Spitzbergen, Danes Gat, depth 20—30 m., 7/VII, many spec. WULFF.

in 1900:

stat. 3. West Spitzbergen, Ice Fiord, Coal Bay, depth 50—100 m., stones, 22/VI, one spec.

» 5. West Spitzbergen, Ice Fiord, Green Harbour, depth 10—80 m., stones, 25/VI, eight spec.

» 8. West Spitzbergen, King's Bay, depth 10—30 m., stones and sand with Laminariæ, 29/VI, six spec.

» 15. East coast of Jan Mayen, depth 70—80 m., sand, 22/VII, many spec.

» 17. East Greenland, Mackenzie Bay, N. of Kaiser Franz Joseph Fiord, depth 12—35 m., mud, 1/VIII—3/VIII, several spec.

» 23. ibidem, depth 3—10 m., mud and sand with Laminariæ, 11/VIII, many spec.

» 24. East Greenland, Mackenzie Bay N. of Kaiser Franz Joseph Fiord, depth 1—3 m., sand, 11/VIII, two large and many young spec.

Distribution:

Mysis oculata is, without doubt, the most common among Arctic Mysideans, and at the same time, sometimes occurs in enormous shoals, rivalling *Rhoda inermis* and *Nyctiphanes norvegica* in its multitude of specimens. In fact, these species supply some Balænopterids and sea-birds with their essential food. *Mysis oculata* has been obtained off West Greenland, in Smith Sound, off Baffin Land, Labrador, and New England, in the Siberian Polar Sea W. of Tajmur Peninsula, Kara Sea, Murman Sea, round Spitzbergen, off Finmarken, Iceland, Jan Mayen, and East Greenland. It must, therefore, be considered an Arctic species; although it was not obtained, according to Stuxberg, during the Vega Expedition E. of Tajmur Peninsula, and although it has not yet been observed, as far as I know, in the Behring Sea or the adjacent parts of the Arctic Ocean, further discoveries in these tracts of the sea, hitherto so little explored for zoological purposes, will, I think, prove that it must also be regarded as circumpolar.

It lives in moderate depths from a few up to 20 fathoms. Such depths as 80—100—110 metres, which are recorded above in the list of localities, are the greatest I have found for the species; but, as Hansen has pointed out, it is very probable that it lives pelagic a great deal of the year, and, therefore, the above figures are not very trustworthy, as the animal might have been taken by the trawl when carried up.

Length of largest spec.: 28 mm. A specimen which I dredged in 1894 in Smith Sound, measured 33 mm. (OHLIN, l. c. p. 9).

41. **Mysis mixta** LILLJEBORG.

1852. Mysis mixta LILLJEBORG, Hafs-Crust. vid Kullaberg etc., l. c. p. 6.
1861. » latitans KRÖYER, Mysidæ, l. c. p. 30, tab I, fig. 4 a—b.
1879. » mixta G. O. SARS, Carcinol. Bidr. etc., l. c. III, p. 76. tab. XXXIII.

Localities:

in 1900:

stat. 17. East Greenland, Mackenzie Bay, N. of Kaiser Franz Joseph Fiord, depth 12—35 m., mud, 1/VIII—3/VIII, four spec.
» 23. ibidem, depth 3—10 m., mud and sand with Laminariæ, 11/VIII, several spec.

This species was first described by LILLJEBORG from specimens obtained in Öresund. Nine years afterwards KRÖYER redescribed it as *Mysis latitans* after specimens from Greenland; but, as SARS has pointed out, both are indentical. The species is very often to be found together with *Mysis oculata*, which it closely resembles, but from which it is easily to be distinguished by the pointed *squamæ antennarum*, the somewhat different form of the incisure of the telson, and by a lighter colour, the black star-formed spots being here of smaller size.

Mysis mixta has been obtained off East and West Greenland, New England as far south as Massachusetts Bay, Iceland, Lofoten Islands, and Finmarken. Although it is on this account, to be regarded as an Arctic species. it occurs, however, farther south, viz. in the interior part of Christiania Fiord, in Öresund, and in the Baltic.

It seems to live in the Arctic in the same depths as the preceding species, but, farther south, it dwells in deeper water. Thus according to SMITH, it has been obtained, off the coasts of New England, only in depths varying from 20 up to 90 fathoms.

Length of largest spec. 30 mm.

Pseudomysis G. O. Sars 1879.

Among the new and interesting finds with which our knowledge about Arctic crustaceans was enriched by the Norwegian North Atlantic Expedition, is a Schizopod for which Sars has established a new genus, viz. *Pseudomysis*. Unfortunately he had only two very mutilated specimens, both females, at his disposal, so that his description is, in some respects, incomplete. During the Swedish Arctic Expedition 1898 I got a fragment of this remarkable Mysidean from the »Swedish Depth» together with a few specimens of *Boreomysis scyphops*. As that fragment happens to be the very mutilated pleon of a male, I am here able to complete Sars' description with regard to that important part.

42. **Pseudomysis abyssi** G. O. Sars.

1879. Pseudomysis abyssi G. O. Sars, Crust. et Pycnog. nova etc., l. c. p. 430.
1885. » » G. O. Sars, Norweg. North Atl. Exp. I, p. 50, pl. 5, fig. 13—21, pl. 20, fig. 18—20.

Locality:

in 1898:

stat. 26. lat. 78° 19′ N., long. 8° 41′ E., the »Swedish Depth», depth 2700 m., bottom temp. — 1,4° C., Biloculina clay, 25/VII, one spec. (very mutilated pleon of a male).

Although my fragment of this species is in a very bad condition, it evidently proves that this deep-sea Mysidean comes nearest to *Boreomysis* or *Mysideis*, as Sars has already, suggested, on account of the structure of the oral parts. The pleopods of the male are developed as two-branched swimming-plates. It is, however, impossible for me to give any exact description or complete figures of them, because they are broken and much mutilated. Contrary to what is usually the case, they all seem to be of about the same size and structure. Even the first pair has the endopodite well developed and is not rudimentary. I have figured the fifth pleopod, which was most complete. The endopodite is here longer than the exopodite, and uniarticulate, although I can not be quite certain as to this, as one or two articulations may be broken off. I am not able to decide if the usual plate at the base of the inner branch is wanting. I think, however, that an indication of it is to be found. I have marked it in the figure with x. The exopodite is much smaller, and consists of five joints, the first of which is by far the largest. Thus, the male pleopods deviate in some points from the allied species, but, as this is the case even in species belonging to the same genus, f. i. *Mysideis insignis* and *M. grandis*, I think that this unusual structure ought not to prevent us from thinking that Sars is right, in considering that *Pseudomysis* approximates closest to *Mysideis*.

This species is an inhabitant of the deep basin between East Greenland on the one side, and Spitzbergen-Norway on the other. One of Sars' specimens was taken in the trawl N.W. of Finmark at the depth of 1110 fathoms, the other was found in the ventricle of *Rhodichthys regina* from a station farther West, at a depth of 1280 fathoms.

Length of pleon of my specimen 19 mm. Sars estimated the length of his largest specimen, which, however, was not fullgrown, to be about 35 mm.

Note. It ought to be observed that »Rivalen Sound» and »Giles' Land» in this treatise are nominated respectively »Bremer Sound» and »White Island» in my previous paper. The reason is that I then followed the English sea-chart. As Prof. Nathorst has shown that the term »Rivalen Sound» has priority to »Bremer Sound», the former name must conquently be used. And as he has also shown that »White's Island» is the same as »Giles' Land», the latter appellation is the correct one.

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Explanation of the figures.

Fig. 1. *Bythocaris simplicirostris* G. O. SARS.

I. Carapace from side. II. Second, third, and fourth segments of pleon. a_1. antennula a_2. scale of antenna, mxp_3-third maxilliped p_2. second pereiopod.

» 2. *Pandalus borealis* KRÖYER, chela of first pereiopod.

» 3. *Boreomysis nobilis* G. O. SARS.

Mp. palp of mandible, *U.* uropods.

» 4. *Amblyops Sarsi* n. sp.

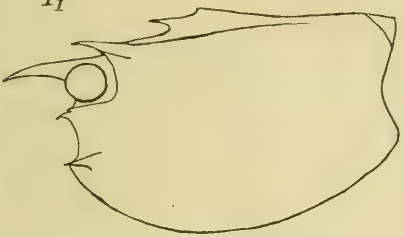
I. From above, II. Cephalic portion, from above, III. same from side. $T + U$, telson and uropods.

» 5. *Pseudomma Théeli* n. sp.

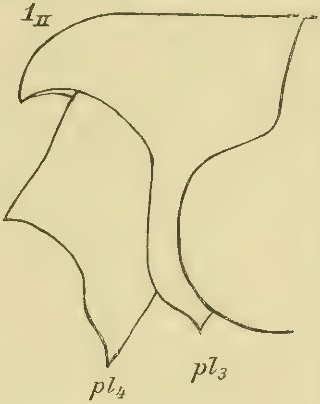
I. Cephalic portion, from above, a_2. antenna, *Mp.* palp of mandible, *mxp.* maxilliped, p_1, first pereiopod (gnathopod). *U*, uropods, *T.* telson.

» 6. *Pseudomysis abyssi* G. O. SARS, fifth pleopod of male.

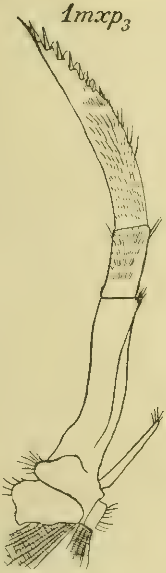
1_{I}



1_{II}



$1mxp_3$



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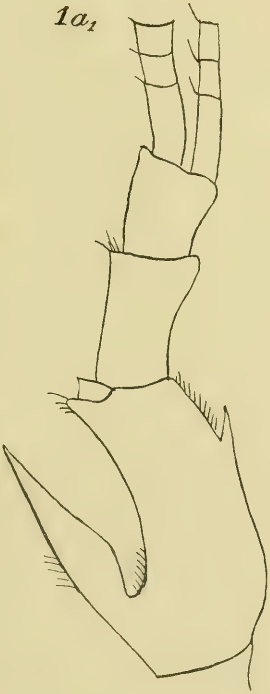

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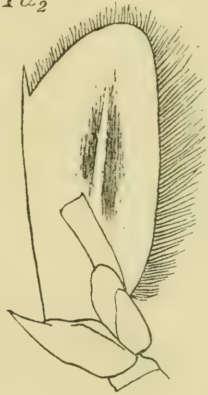

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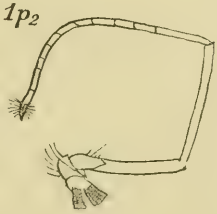
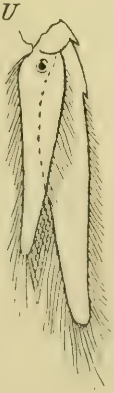


$3U$



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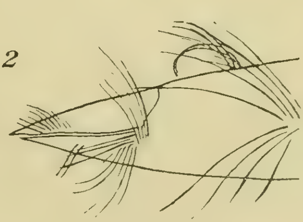
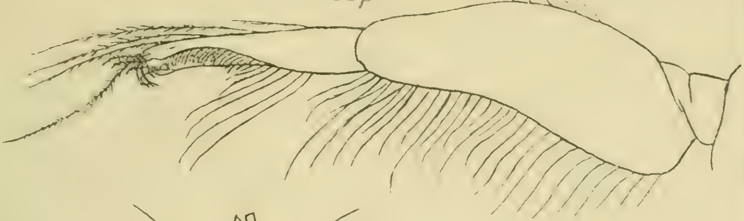
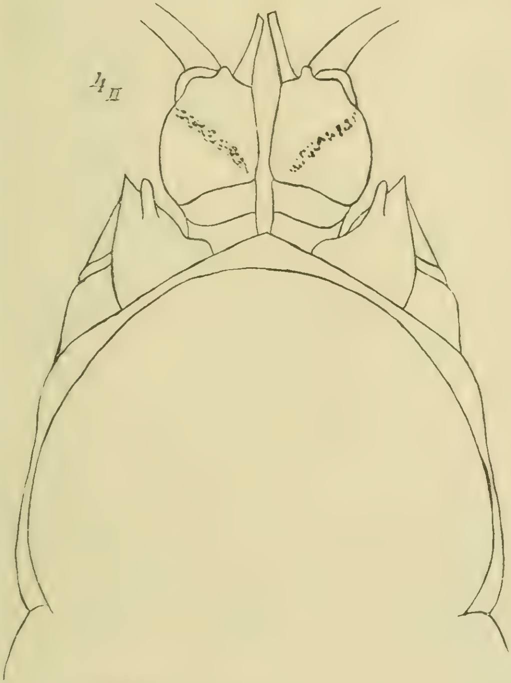


A.Ohlin. del. J.Cederquist foto.

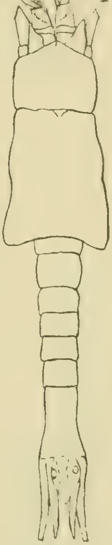
3 Mp



4 II



4 I



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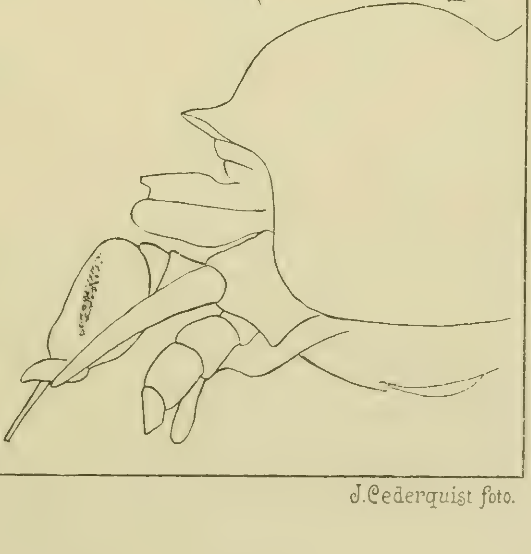
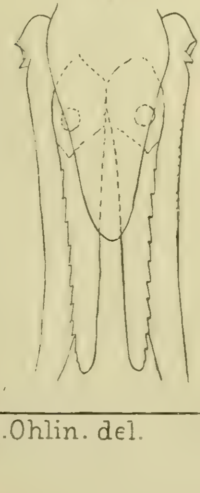


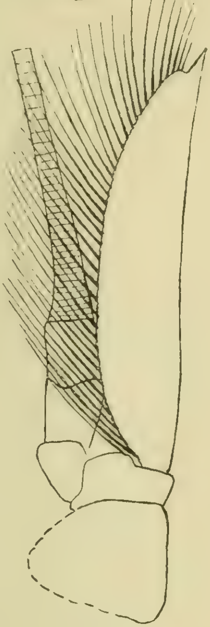
4 T+U



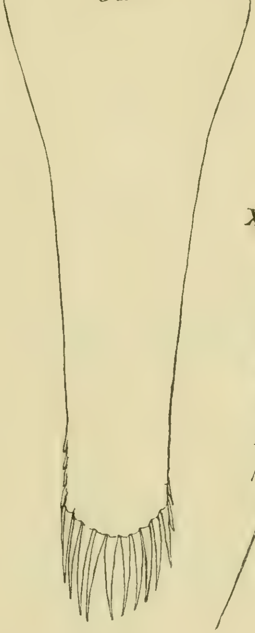
A. Ohlin. del.

J. Cederquist foto.

5 a_2



5 T



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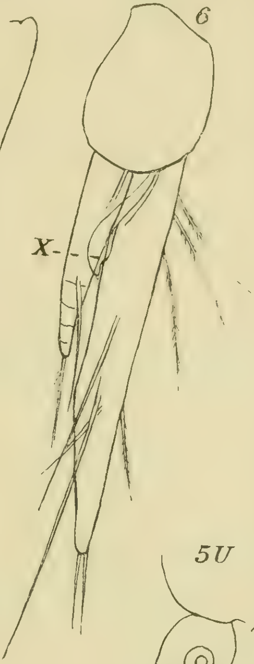
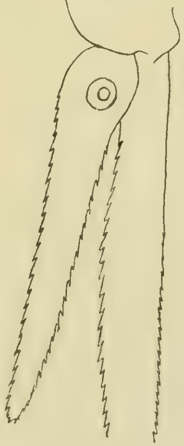
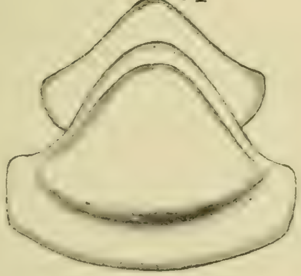


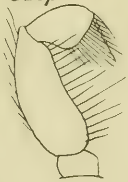
5 U



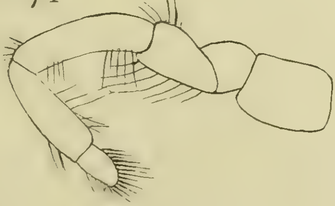
5 r



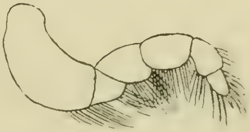
5 Mp



5 p_1



5 mxp



A. Ohlin. del. J. Cederquist foto

BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 27. Afd. IV. N:o 9.

ZUR KENNTNISS DER
LITORALEN ARTEN DER GATTUNG BDELLA LATR.

VON

IVAR TRÄGÅRDH,
UPSALA.

MIT ZWEI TAFELN.

MITGETEILT AM 11. DEZEMBER 1901.
GEPRÜFT VON HJ. THÉEL UND CHR. AURIVILLIUS.

◆

STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1902

Über Acarus littoralis Linné.

Der erste, welcher litorale Milben erwähnt und beschrieben hat, ist Linné, der 1758 in Systema Naturæ[1]) von *Acarus littoralis* sagt »habitat in Europæ littoribus«. Die nächste Angabe finden wir 1780 in Fauna Groenlandica von Otho Fabricius, welcher eine an den Ufern von Groenland gefundene Acaride mit *A. littoralis* L. identifiziert. Im Jahre 1794 nimmt J. Chr. Fabricius die Linné'sche Art in seiner »Entomologia Systematica« (p. 433) auf und ergänzt die Beschreibung, und ebenso 1805 (p. 364) in »Systema Antliatorum«, wo er sie der Gattung *Gamasus* zurechnet. Von den späteren Autoren haben nur zwei *Acarus littoralis* erwähnt: Berlese,[2]) welcher vermutet, dass die Art der Gattung *Bdella* nahe stehe, und Trouessart,[3]) welcher sie mit dem von ihm und Berlese[4]) von den Küsten Frankreichs beschriebenen *Rhyncholophus miniatus* (Herm) var. *rubipes* identifiziert.

Wie man sieht, sind also die Autoren betreffs der Identifizierung von *Acarus littoralis* L. verschiedener Auffassung. Meiner Ansicht nach ist Berleses Vermutung ganz richtig. *A. littoralis* ist ohne Zweifel eine *Bdella.* Für diese Auffassung sprechen folgende Thatsachen. In Systema Naturæ citiert Linné seine Reise auf Öland p. 96. Wir finden da eine etwas eingehendere Beschreibung der fraglichen Milbe, die ich hier in Übersetzung wiedergebe: »Ein Acarus, der klein und rot war und dem Acarus, welcher im Sommer sich auf den Johannisbeersträuchen aufzuhaltern pflegt, ähnelte, obgleich er doppelt so gross war, lief auf den Steinblöcken, welche am Ufer waren, ziemlich allgemein herum; sein Bauch war rotbraun, aber seine Füsse waren alle blutrot». Es unterliegt keinem Zweifel, dass die Milbe, welche Linné auf Johannisbeersträuchern gesehen hat und später unter dem Namen *Acarus baccarum* beschreibt, *Actineda vitis* (Schrank) Berlese ist. Diese Milbe hat eine Länge von ca. 1,2 mm. *Acarus littoralis*, welcher nach Linnés Angabe doppelt so gross ist, hat also eine Länge von ungefähr 2,5 mm. Dieses Mass stimmt ganz mit der durchschnittlichen Länge der an den Küsten Schwedens vorkommenden *Bdella*-Art, übertrifft dagegen weit die Länge von *Rhyncholophus miniatus* (Herm) *var. rubipes* Berl. & Trt. welcher im Durchschnitt nur eine Länge von 1,6—1,8 mm. hat. Der Ausdruck »sein Bauch[1]) war rotbraun, aber die Beine blutrot«, welcher offenbar die Identifizierung von Trouessart veranlasst hat, passt ebenso gut auf die Farbe der *Bdella*, welche, obgleich die Hautfarbe rot ist, dennoch oft rotbraun gefärbt erscheint, wenn der Magen gefüllt ist und sein dunkler Inhalt durch die Haut durchschimmert.

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[1]) Ed. X p. 618.

[2]) Acari. Myriapoda et Scorpiones Italiæ, ordo Mesostigmata, pag. 65.

[3]) Revision des acariens arctiques. Soc. Nat. d. Sciences Nat. et Mat. de Cherbourg. Tome XXIX 1892—1895, pag. 184.

[4]) *A. Berlese et E. Trouessart.* Diagnoses d'Acariens nouveaux ou peu connus. Bull. de la Bibl. scient, de l'Ouest II 1889, pag. 131.

Die Annahme, dass *A. littoralis* eine *Bdella* sei und also *nicht* mit *Rhynchol. miniatus* (Herm) *var. rubipes* Berl. & Trt identisch, wird durch die geographische Verbreitung dieser beiden Formen völlig bestätigt. Auf einer Reise im Sommer 1898 der schwedischen Küste entlang hatte ich nämlich Gelegenheit, die Acaridenfauna der Küste und der Schären auf 24 verschiedenen Lokalitäten, welche ziemlich gleichmässig über unsre Ostküste von Blekinge bis zu Hernösand verteilt liegen, zu untersuchen. Auf 22 von diesen traf ich eine *Bdella*-Art an, und immer kam sie in grosser Anzahl vor. Nur auf zwei Lokalitäten wurde eine *Rhyncholophus*-Art gefunden. Auch von der Insel Öland selbst entstammende *Bdella*-Formen besitze ich, welche von einem Freunde von mir gesammelt sind; dagegen ist kein *Rhyncholophus* von ihm dort am Ufer gefunden worden.

Da somit festgestellt ist, dass eine *Bdella* überall an der Ostküste von Schweden allgemein vorkommt, während *Rhyncholophus* dagegen sehr selten ist, bestätigt diese Thatsache die Annahme, dass die Milbe, welche Linné auf seiner öländischen Reise am Meeresufer sah und später als *Acarus*

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[1]) Bauch = Abdomen, was aus einer anderen Beschreibung hervorgeht.

littoralis beschrieb, eine *Bdella*-Art sei. Für die obenerwähnte nach meinen Befunden an der schwedischen Ostküste ungemein häufig vorkommende *Bdella*-Art werde ich daher im Folgenden den Namen *B. littoralis* (L.) gebrauchen. Da nun eine mit dieser schwedischen *Bdella*-Art identische Form auch mehrmals auf Grönland gefunden ist, ist wahrscheinlich die von O. FABRICIUS vorgenommene Identifizierung richtig.

Auch der von J. CHR. FABRICIUS 1794 beschriebene *A. littoralis* scheint eine *Bdella* zu sein. Er beschreibt das Tier in folgender Weise: »Acarus ovatus, ruber, rostro porrecto subulato. Corpus ovatum, glabrum. Antennæ quadriarticulatæ, filiformes. Caput et torax sanguinea. Abdomen valde obtusum, magis obscurum, utrinque punctis aliquot impressum». Die Ausdrücke: »Corpus glabrum» und »Antennæ quadriarticulatæ, filiformes» schliessen eine Identifizierung mit irgend einer *Rhyncholophus*-Art aus, deuten vielmehr bestimmt auf eine *Bdella*-Art hin. Die dritte Gattung, welche litorale Arten aufweist und somit hier in Betracht gezogen werden kann, *Gamasus*, wird u. a. durch die Angabe, dass die Farbe rot sei, ausgeschlossen. Wenn man also mit einem hohen Grade von Wahrscheinlichkeit diese Acaride mit der LINNÉschen Art identifizieren darf, ist es dagegen sehr fraglich, ob J. CHR. FABRICIUS in seiner späteren Arbeit (1805) unter demselben Namen dieselbe Acaride beschrieben hat. In dieser Arbeit teilt er die Gattung *Acarus* in fünf verschiedene Gattungen ein: *Ixodes*, *Acarus*, *Bdella*, *Gamasus* und *Atax*. Zu der Gattung *Bdella*, welche folgendermassen charakterisiert wird, »Palpi[1] filiformes, quinquearticulati: articulo ultimo setis duabus. Antennæ nullæ», rechnet er nur eine Art, *B. longicornis*, welche er vorher (1794) in folgender Weise beschrieben hat: »Acarus ruber, antennis bifidis rostro longioribus». *Acarus littoralis* dagegen, wovon er jetzt eine viel kürzere Beschreibung liefert: »ovatus, ruber, haustello porrecto subulato», rechnet er zu der Gattung *Gamasus*, welche er mit diesen Worten charakterisiert: »Palpi triarticulati articulo ultimo chelato. Antennæ nullæ». Diese Diagnose passt indessen gar nicht auf die Acaride, welche er in seiner vorigen Arbeit mit den Worten »Antennæ quadriarticulatæ, filiformes» beschrieben hat, und es ist einfach unmöglich, dass seine spätere Diagnose von *A. littoralis* sich auf eine *Bdella* beziehen lässt. Dagegen ist es gar nicht unmöglich, dass Fabricius im letzteren Falle eine *Rhyncholophus*-Art[1]) vor sich gehabt, und es liegt dann nahe, an die obengenannte Art *R. miniatus* (Herm) *var. rubipes* Berl. & Trt zu denken, welche ich übrigens auch selbst an der Westküste Schwedens gefunden habe.

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[1]) Was er vorher als Antennæ bezeichnet hat, nennt er also hier Palpi.

Fabricius hat aber unter dem Gattungsnamen *Gamasus* eine Menge von Arten zusammengefasst, auf welche die Diagnose »Palpi triarticulati articulo ultimo chelato» gar nicht passt, und man darf daher bei Beurteilung seines »Gamasus littoralis» kein grosses Gewicht auf den Umstand legen, dass er ihn zu der in der erwähnten Weise charakterisierten Gattung Gamasus gerechnet hat. Dagegen kann man unmöglich annehmen, dass Fabricius wenn er 1805 wirklich eine Bdella-Art vor den Augen gehabt hätte, nicht die nahe Verwandtschaft zwischen dieser und seiner *Bdella longirostris* würde ein gesehen haben, da ja die Gattung *Bdella* durch das Rostrum und die Palpen und übrigens durch den ganzen Habitus so äusserst charakteristisch ist. Dieser Umstand scheint mir sehr entschieden für die Auffassung zu sprechen, dass sein *G. littoralis* nicht auf eine *Bdella*-Art bezogen werden kann. Es ist somit als ziemlich sicher festgestellt anzusehen, dass Fabricius unter dem Namen *Acarus (Gamasus) littoralis* zwei verschiedene Milben beschrieben hat, und dass *A. littoralis* (1794) eine *Bdella* ist und mit *B. littoralis* (L.) identisch, während dagegen sein *G. littoralis* (1805) mit *Rhyncholophus miniatus* (Herm) *var. rubipes* Berl. & Trt identisch sein dürfte.

Die Synonymie von *Bdella littoralis* (L.) wird demnach die folgende:

[1745. *Acarus littoralis* Linné. Öländska Resan, p. 96].
1758. » » » Systema Naturæ, Ed. X. p. 618.
1780. » » Otho Fabricius. Fauna Groenlandica p. 225.
1794. » » J. Chr. Fabricius. Entomologia Systematica, tome 4, p. 433.

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[1]) Wenigstens streitet seine Diagnose gar nicht dagegen, denn wenn er sagt, dass die Palpen dreigliedrig seien, während sie in Wirklichkeit viergliedrig sind (das Endglied rechnet er als »chela»), beruht dies darauf, dass er das erste Grundglied nicht gesehen hat, was auch sehr schwer ist.

nec 1805. *Gamasus littoralis* J. CHR. FABRICIUS. Systema Antliatorum, p. 364.

Ich gehe jetzt zur näheren Beschreibung derjenigen Form über, für welche ich, wie anfangs erwähnt wurde, den Namen *Bdella littoralis* (LIN.) in Anspruch nehme.

Die Länge des erwachsenen Tieres variiert zwischen 2 und 3 mm. bei einer Körperbreite von 0,8—1,2 mm. Die Länge der Mandibeln beträgt bei einem Exemplare von 2 mm. Länge 0,5 mm., bei einem Exemplare von 2,5 mm. Länge 0,56 mm. und bei einem Exemplare von 3 mm. Länge 0,64 mm. Die Breite bei einem 2,5 mm. langen Exemplare ist 0,16 mm., bei einem Exemplare von 3 mm. Länge 0,171. Die Länge der Taster ist resp. 0,66 mm., 1,032 mm. und 1,143 mm.

Die Mandibeln (Fig. 5, 7, 9, 10. Taf. II) tragen auf ihrer Rückenfläche 10—14 Haarborsten, deren Placierung, aus den Figuren ersichtlich ist und sehr variiert.

Die Taster (Fig. 1, 7. Taf. I) sind lang und kräftig entwickelt. Das zweite Glied, das die anderen an Dicke übertrifft, nimmt nach dem distalen Ende zu allmählich an Dicke zu. Die übrigen Glieder sind ihrer ganzen Länge nach von gleicher Dicke; das fünfte ist fast cylindrisch, schmäler als die übrigen und an der Spitze abgerundet. Die Längenverhältnisse der Glieder vom zweiten bis zum fünften sind durch 0,459, 0,081, 0,171, 0,432 mm. (bei einem Exemplare von 3 mm. Länge) ausgedrückt. Hieraus ist ersichtlich, dass das zweite Glied das fünfte an Länge ein wenig [ca. 0,03 mm.] übertrifft und dass das vierte eine etwas grössere Länge als das dritte erreicht. Übrigens variieren die Glieder an Länge nicht unbeträchtlich, wie ich im Folgenden bei der Revision der übrigen bis jetzt beschriebenen Arten zeigen werde.

Dagegen kann man in der Stellung, Zahl und Grösse der auf den Tastergliedern befindlichen Borsten eine gewisse Regelmässigkeit spüren, wenn es auch hier Schwankungen giebt, vovon ich mich durch genaue Untersuchung von mehr als 30 Exemplaren habe überzeugen können.

Am zweiten Gliede sind die Haarborsten wesentlich in der inneren distalen Hälfte aufgestellt — am Grunde des Gliedes befindet sich, auf der Unterseite inseriert, nur eine Borste und in zwei Reihen geordnet; die eine Reihe enthält zwei Rückenborsten, die andere gewöhnlich vier, welche distalwärts an Länge zunehmen. Ziemlich oft trifft man deren nur zwei an. und zwar sind dabei die beiden kleineren proximalen verschwunden.

Das dritte Glied trägt nur eine Rückenborste; nur einmal habe ich an diesem Gliede zwei Borsten (und dies dabei nur an dem einen Taster) gefunden.

Am vierten Gliede sind vier bis sechs Borsten vorhanden; diejenigen vier, welche sich regelmässig wiederfinden, sind sehr weit nach dem Vorderende des Gliedes gerückt. Zwei von ihnen sind nach oben, die zwei anderen nach unten gerichtet; von den letzten ist die auf der Innenseite des Gliedes befindliche kräftiger und erreicht die Länge von den längsten Borsten des Endgliedes.

Das fünfte Glied trägt eine grosse ziemlich variierende — *(17—23)* — Anzahl von Borsten, welche gleichmässig über das ganze Glied verteilt sind. Die am Ende des Gliedes eingefügten übertreffen, obwohl ziemlich unbedeutend, die übrigen an Länge.

Biologie.

Den ersten Beitrag zur Biologie der Bdelliden liefert *Karpelles* 1893.[1]) Sie sind nach ihm ausschliesslich Pflanzenfresser. Man findet im Darminhalte die Reste von Moosen (Gefässbündel, Zellen), unter denen sie leben. Ausserdem enthalten alle Theile (Mitteldarm und Blindsäcke) schwärzliche Klumpen Erde.

Trouessart [2]) (1894) konstatiert, dass *B. sanguinea*, welche an den Küsten lebt, sich von Collembolen ernährt.

Michael [3]) (1896) bestätigt die Angabe von Trouessart und hebt mit Recht hervor, dass Karpelles Angabe von dem Darminhalte gegen die von K. gemachte Beobachtung, dass die Darmentleerungen eine flüssige Konsistenz haben, spreche.

Er findet auch, dass die Mundteile nicht diejenigen eines Pflanzenfressers sind, sondern die eines Flüssigkeiten aufsaugenden Tieres.

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[1]) Zur Anatomie von Bdella arenaria (Kramer). Verhandl. d. k. k. zool.-bot. Ges. Band XLIII 1833, pag. 426.

[2]) Note zur une grande espèce de Bdella maritime originaire d'Islande. Journ. Anat. et. Physiol. (Robin's) XXX 1894, n:r 1 pag. 117—125.

[3]) Anatomy of Bdella. Trans. Linn. Soc. London. 2 ser. Vol. VI. part 7, pag. 480.

Meine eigenen Beobachtungen, welche auf den äusseren Schären an den Küsten von Schweden im Sommer 1898 ohne Kenntnis von der einschlägigen Literatur angestellt wurden, bestätigen vollauf die Angaben von TROUESSART und MICHAEL. Betreffs des Verhaltens von *B. littoralis* zu den Collembolen wurden keine Beobachtungen gemacht. Dagegen beobachtete ich mehrmals, dass *Bdella* die auf den Schären überall ungemein häufig vorkommende Mücke (*Chironomus* sp.), deren Larven die kleinen Wassertümpel bevölkerten, aussog. Einmal beobachtete ich zwei Milben damit beschäftigt, zusammen eine Mücke auszusaugen. Ein anderes Mal hatte eine Milbe eine sehr kleine Fliege überwältigt. Sehr oft sah ich die Milbe auf der Oberfläche der kleinen Wasseransammlungen herumwandern, um diejenigen Mücken, welche bei der Entpuppung verunglückt waren, auszusaugen. Solche verunglückte ertrunkene Individuen trifft man immer in Menge in den Tümpeln der Schären an, und diese bieten also immer den Milben eine sehr leicht zugängliche Nahrung.

Revision der bis jetzt beschriebenen litoralen Bdella-Arten.

Es sind bis jetzt folgende litoralen *Bdella*-Arten beschrieben:

1758. *Acarus littoralis.* L. (siehe Seite 1).
1847. *Bdella Basteri.* JOHNSTON. »The Acarides of Berwickshire specifically described», Trans. Berwickshire Naturalists' Field. Club. Vol. II (1847), p. 221.
1871. *Bdella arctica.* THORELL. Om Arachnider fr. Spetsbergen och Beeren-Eiland. Öfv. Kongl. Vet.-Akad. Förhandl. 1871, N:o 6, p. 698.
» *B. decipiens.* THORELL. Ibid. p. 699.
1878. *B. grandis.* L. KOCH. Arachniden aus Sibirien und Novaya-Semlja. Kongl. Vet.-Akad. Handl. Bd. 16. N:o 5, p. 133, tab. 7, fig. 7.
» *B. pallipes.* L. KOCH. Ibid. p. 131, tab. 7, fig. 4.
1883. *B. villosa.* L. KOCH & NEUMAN. Acariden während der Vega-Expedition eingesammelt. Vega.-Exp. Vetensk. Arbeten. Bd. III, p. 525, tab. 41.
» *B. borealis.* L. KOCH & NEUMAN. Ibid. p. 526.

1884. *B. marina.* PACKARD. The American Naturalist. pp. 827—828, fig. 2.

1888. *Eupalus sanguineus.* TROUESSART. Comptes Rendus de l'Acad. d. Science Nat. t. CVII, pp. 753—755.

1890. *Bdella vulgaris* (HERM) *var. littoralis.* MONIER. Acariens et Insectes marins des côtes du Boulonnais. Revue Biologique du Nord de la France. t. XI, pp. 196—198.

1894. *B. sanguinea.* TROUESSART. »Note sur une grande espèce de Bdelle maritime originaire d'Islande.» Journ. Anat. et Physiol. (Robins) XXX, N:o 1. pp. 117—125.

1899. *B. frigida.* BANKS. Report of the Fur Seal Expedition part. IV. p. 348. Plate A, fig. 5.

Unter diesen gehören *B. littoralis*, *Basteri*, *arctica*, *grandis*, *pallipes*, *villosa*, (*marina?*) und *sanguinea* zu einer besonderen Gruppe, die dadurch charakterisiert ist, dass die Mandibeln eine grosse Anzahl Haarborsten (mindestens 8) besitzen; bei *B. decipiens*, *borealis* und *vulgaris var. littoralis* dagegen tragen die Mandibeln nur zwei Haarborsten. Bei *B. marina* und *frigida* wird die Zahl der Mandibularborsten nicht angegeben.

Bei der Revision dieser Arten hatte ich durch die zuvorkommende Güte des Intendenten der entomologischen Abteilung des Naturhistorischen Reichsmuseums zu Stockholm, Herrn Prof. CHR. AURIVILLIUS, die Typen der von THORELL und L. KOCH beschriebenen *Bdella*-Arten (*B. arctica*, *decipiens*, *grandis* und *pallipes*) zu meiner Verfügung und weiter auch die von den letzten schwedischen arktischen Expeditionen zusammengebrachten Acaridensammlungen und das von mir selbst im Jahre 1898 an der Ostküste und 1899 an der Westküste von Schweden gesammelte sehr reichhaltige Material. Schliesslich hatten Dr. E. L. TROUESSART und Dr. A. D. MICHAEL die grosse Liebenswürdigkeit, mir die Typen der von ihnen beschriebenen *B. sanguinea* und *B. Basteri* zu senden.

Die Frage nach der Identität mehrerer in der Literatur beschriebenen Bdella-Arten ist schon von MICHAEL (l. c. p. 479) erörtert worden. Da er aber keine Typen untersucht hat, spricht er nur Vermutungen aus; diese Vermutungen haben sich nichtsdestoweniger, wie ich im Folgenden näher dar-thun werde, als ganz zutreffend erwiesen, und meine Untersuchung bringt somit nichts völlig Neues. Um aber die Frage ein für allemal endgültig zu entscheiden, war es bei der Unvollständigkeit mehrerer der bisherigen Beschreibungen notwendig, die Typen zu revidieren und auch die Variabilität der als Artmerkmale angewendeten Charaktere näher zu untersuchen.

I. **Bdella**-Arten mit mehreren Borsten auf den Mandibeln.

B. Basteri Johnst und *sanguinea* Trt.

Wir fangen mit *B. Basteri* und *B. sanguinea*[1]) an. Michael konstatiert bei diesen, dass die Taster von *B. Basteri* denjenigen von *B. sanguinea* gleich sind, da aber Trouessart nicht den Borstenbesatz der Mandibeln beschreibt, ist es ihm nicht möglich, die Arten mit absoluter Sicherheit zu identifizieren. Nachdem ich nun die Typen beider Arten untersucht habe, kann ich die Frage entscheiden. Die Mandibeln beider Formen tragen 11—14 Haarborsten. Auch in dieser Hinsicht stimmen sie also völlig mit einander überein, und es unterliegt somit keinem Zweifel, dass sie mit einander identisch sind.

B. sanguinea Trt. und *arctica* Thor.

Michael vermutet weiter, dass *B. marina*, *villosa* und *arctica* auch mit *B. Basteri* (*sanguinea*) identisch seien, obgleich bei den beiden letztgenannten das fünfte (End-)Glied der Taster kürzer als das zweite ist.[2] Die von L. Koch beschriebenen *Bdella*-Arten bespricht er dagegen gar nicht.

Eine durchaus entgegengesetzte Auffassung hat P. Kramer, der in »Grönländische Milben»[3]) eine eingehende Beschreibung der Taster und der Mandibeln von *B. arctica* liefert. Er giebt zwar zu, »dass *B. sanguinea* in gewisser Hinsicht eine grosse Übereinstimmung mit *B. arctica* zeigt, aber dieselbe ist keineswegs mit letzterer übereinstimmend. Vielmehr beweist die relativ grössere Länge des Tasterendgliedes gegenübér dem zweiten Gliede, sowie die Behaarung der einzelnen Tasterglieder hinreichend die Verschiedenheit. Folgende Verschiedenheiten sind nach ihm zwischen *B. arctica* und *B. sanguinea* vorhanden: Während bei *B. arctica* am zweiten Gliede sieben Borsten, am vierten Gliede fünf vorhanden sind, von denen eine sich durch eine besondere Länge kennzeichnet, und am fünften Gliede ungefähr 22 gezählt werden, sind am zweiten Gliede bei *B. sanguinea* nur drei Borsten vorhanden, am vierten nur vier, ohne dass irgendeine unter ihnen eine besondere Länge hätte, und am fünften Gliede werden höchstens 16 gezählt. Und zu diesen Verschiedenheiten, welche die Taster bieten, kommen noch diejenigen hinzu, welche die Mandibeln and die Hand geben. Bei *B. arctica* zählt man acht Borsten auf der oberen und äusseren Mandibelfläche, während nach TROUESSART dasselbe Organ bei *B. sanguinea* nur sechs Borsten besitzt.

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[1]) *Eupalus sanguineus* Trt. identifiziert der Auctor selbst mit dieser Art.

[2]) Denn wie er sagt »these, however, are small points, and the probability that the creatures are identical is increased by the fact that Trouessart received some of his specimens of *B. Basteri* (*sanguinea*) from Iceland, and these had the fifth joint of the palpus rather shorter than in the French specimens, so that it seems probable that *B. villosa* (and *B. arctica*) is at most a local variety».

[3]) Bibl. Zoologica. H. 20. Lief. 3. 1897. pag. 79—80.

Es scheint die Sache nach dieser Auseinandersetzung von P. KRAMER abgemacht zu sein. Wenn wir aber die von P. KRAMER gelieferte Zusammenfassung der von TROUESSART gegebenen Beschreibung von *B. sanguinea* mit der Originalbeschreibung und Originalfigur vergleichen, finden wir, dass er den Unterschied übertrieben hat.

Während nach KRAMER *B. sanguinea* am zweiten Gliede der Taster nur drei Borsten besitzen soll, sagt TROUESSART *im Texte* deutlich, dass an diesem Gliede 5 Borsten vorhanden seien, obgleich *die Abbildung* nur diejenigen drei Borsten, welche über den Rand des Gliedes hervorragen, zeigt.

Am vierten Gliede sollen nach KRAMER vier Borsten vorhanden sein, und TROUESSART sagt wirklich so im Texte, aber die Abbildung zeigt fünf Borsten. Am fünften Gliede sind nach KRAMER höchstens 16 Borsten vorhanden; TROUESSARTS Abbildung zeigt 17.

Die Mandibeln besitzen nach KRAMER nur sechs Borsten. In Wirklichkeit sagt TROUESSART aber nur, dass sie *am äusseren Rande* sechs Borsten besitzen; über die eventuell anderswo auf der Oberfläche der Mandibeln befindlichen äussert er nichts.

In der That ist somit nach der von TROEUSSART gelieferten Beschreibung von *B. sanguinea* und der von KRAMER von

B. arctica gegebenen kein so grosser Unterschied zwischen diesen Arten, wie letzterer behauptet, vorhanden.

Durch die Untersuchung der Typen von THORELL und TROUESSART geht hervor, dass der Unterschied in Wirklichkeit noch geringer ist,

	Borsten: der Taster.				B. der Mandibeln.	Länge der T. glieder.	
	2	3	4	5		2	5
B. arctica	7, 7	1, 1	5—6	22, 22	10—13	0,400	0,380
B. sanguinea . . .	6, 7	1, 1	6, 5	21, 22	13, 12	{0,380 0,384	0,400 6,412

indem der Borstenbesatz der Taster und der Mandibeln bei beiden Formen ganz derselbe ist. Der einzige Unterschied *zwischen den Typen* besteht in der relativ grösseren Länge des fünften Tastergliedes dem zweiten gegenüber bei *B. sanguinea* (Fig. 6, Taf. I) und im Vorhandensein einer besonders langen Haarborste am vierten Gliede bei *B. arctica* (Fig. 3, Taf. I).

Eine vergleichende Untersuchung von mehreren Exemplaren lehrt uns aber, dass die relative Länge dieser Tasterglieder und die Länge der Borste sehr variieren und dass somit die beiden Formen nur als Variationen einer und derselben Art zu betrachten sind.

Die oben beschriebene *B. littoralis*, welche, wie aus Obigem hervorgeht, auch zu derselben Art zu rechnen ist, hat das hauptsächliche Material für die Untersuchung über die Variation des Borstenbesatzes und der relativen Länge der Taster und der Mandibeln geliefert, aber, wie aus der Tabelle ersichtlich ist, habe ich ausser den Typen aus Grönland von THORELL und aus Frankreich und der Bären-Insel von TROUESSART auch die von L. KOCH aus Sibirien mit *B. arctica* und von mir aus der Bären-Insel mit derselben Art identifizierten sowie einige Exemplare aus Norwegen zum Vergleich herangezogen.

		Anzahl der Borsten:										Länge der Exemplare.
		der Taster.								der Mandibeln		
		2		3		4		5				
		l.[1])	r.[2])	l.	r.	l.	r.	l.	r.	l.	r.	mm.
aus der Westküste von Schweden	1	6	6	1	1	5	5	20	19	12	12	2·7
	2	6	6	1	1	6	5	20	19	12	12	2·5
	3	6	7	1	2	6	6	22	23	—	—	2·5
	4	6	5	1	1	4	4	17	18	10	10	2·0
	5	6	6	1	1	5	4	20	21	12	12	2·1
	6	6	6	1	1	5	5	22	18	12	—	3·0
eine Nymphe . .	7	4	4	1	1	4	4	14	16	9	9	—
aus der Ostküste	8	6	6	1	1	5	5	21	23	12	12	2·5
	9	6	6	1	1	—	—	18	18	—	—	—
	10	5	6	1	1	5	6	20	20	14	14	2·0
	11	4	4	1	1	5	5	19	17	10	10	—
Nymphe	12	5	5	1	1	4	4	16	16	9	10	0·8
	13	7	7	1	1	4	5	12	18	13	14	2·5
Typen von arctica von THORELL .	1	7	7	1	1	5	6	22	22	10	13	2[3])
	2	7	7	1	1	5	—	22	23	8	8	—
arctica L. KOCH	1	6	6	1	1	5	5	18	17	9	9	2
	2	6	6	1	1	5	5	21	24	9	9	2
aus Norwegen . . .		7	7	1	1	5	6	26	26	9	9	2·2
sanguinea TRT. aus der Bären-Insel		6	7	1	1	6	5	21	22	13	12	3·0
		8	7	1	1	5	5	25	26	13	14	2·6

Länge des zweiten und fünften Tastergliedes.

		2	5			2	5
1		0·408	0·424	6	l.	0·380	0·380
2		0·372	0·364		r.	0·380	0·388
3	l.	0·392	0·412	7		0·204	0·188
	r.	0·384	0·412	B. arctica Thorells typ. . .		0·400	0·380
4	l.	0·276	0·288	sanguinea TRT. . . .	l.	0·380	0·400
	r.	0·268	0·280		r.	0·384	0·412
5	l.	0·420	0·428				
	r.	0·448	0·432				

Diese beiden Tabellen zeigen uns, wie ausserordentlich gross die Variation der Charaktere ist, welche als Unterscheidungsmerkmale zwischen den beiden Arten gebraucht worden sind. Es ist nicht einmal möglich, die Formen als Varietäten aufrecht zu halten, denn beide kommen an demselben Orte zusammen ganz regellos vor, und wenn es auch einerseits scheint, als wenn bei den südlichen an den Küsten von Frankreich und England vorkommenden das fünfte Glied der Taster verhältnismässig länger wäre, so kommen andererseits beide Formen auf der Bären-Insel vor, und diese Thatsache schliesst eine Hypothese von zwei durch verschiedene klimatologische Verhältnisse hervorgerufenen Localvarietäten völlig aus. Der Umstand, dass diejenigen Exemplare, welche das Material für die Untersuchung der Variation des zweiten und fünften Gliedes geliefert haben, an der Westküste Schwedens gesammelt sind, also in einem Gebiete, das zwischen zwei hypothetischen Verbreitungsgebieten zweier hypothetischen Localvarietäten liegt, spricht nur scheinbar für diese Hypothese, denn eine eingehende Untersuchung von Formen aus irgend welcher anderen Lokalität würde unzweifelhaft dasselbe Resultat wie das meinige ergeben, nämlich, dass bei dieser Art die Anzahl der auf den Tastern und den Mandibeln befindlichen Borsten im allgemeinen in einem direkten Verhältnis zur Grösse der Individuen steht.

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[1]) das linke Glied.
[2]) das rechte.
[3]) eingetrocknet.

Bdella grandis, L. KOCH.

Auch die *B. grandis* L. KOCH hat sich durch Untersuchung der Typen als mit *B. littoralis* identisch herausgestellt. KOCH giebt als Unterschied von den übrigen hochnordischen Arten den Mangel der beiden langen Endborsten am Tarsalgliede der Palpen und als Kennzeichen gegen *Bdella arctica* THOR. das Fehlen der Augen und die längeren Mandibeln an.

Hinsichtlich des Fehlens der Augen ist ja klar, dass dies schon a priori bei einer Art undenkbar ist, welche sich von einer so nahe verwandten, Augen besitzenden Art, wie *B. arctica*, durch keine besondere Lebensweise unterscheidet. Um diese Angabe aber mit Thatsachen widerlegen zu können, habe ich mich durch Untersuchung der Typen überzeugt, dass die Augen vorhanden sind, obgleich sie durch den Einfluss des Alkohols entfärbt und daher schwer sichtbar sind.

Auch die Angabe KOCHS über die grössere Länge der Mandibeln ist nicht der Wahrheit entsprechend. Die Behaarung der Taster (Fig. 5, Taf. I) und Mandibeln ist aus der folgenden Tabelle ersichtlich

Taster.				Mandibeln.
2	3	4	5	
6–5	1	5–5	18–23	8–10

und liegt innerhalb der Grenzen der bei *B. littoralis* (L.) auftretenden Variation.

Bdella villosa Kramer & Neumann.

Diese Milbe soll nach der Beschreibung leicht durch die reichliche Behaarung — ungefähr 10 Haare — der Mandibeln von anderen unterscheidbar sein. In Wirklichkeit stimmt ja dies sehr gut mit *B. littoralis* überein, und auch die Behaarung und die Längenverhältnisse der Tasterglieder liegen innerhalb der Grenzen der Variation bei dieser Art. Es unterliegt somit keinem Zweifel, dass *B. villosa* mit *B. littoralis* identisch ist,

Bdella frigida Banks.

Diese Milbe ist so unvollständig beschrieben und schlecht abgebildet, dass es schwer ist, über sie ins klare zu kommen. Im Bau der Taster ähnelt sie sehr den unten beschriebenen Varietäten von *B. capillata* Kram.; so ist das zweite und das fünfte Glied von ungefähr gleicher Länge und ebenso das dritte und das vierte; weiter trägt das fünfte Glied zwei lange Endborsten. Da aber die Zahl der Mandibularborsten nicht zuverlässig ist, indem er deren vier angiebt, diese aber über den Rand hervorragen, und es augenscheinlich ist, dass die Mandibeln mehr Borsten besitzten, wage ich kein bestimmtes Urteil auszusprechen.

Bdella pallipes L. Koch.

Die andere von L. Koch beschriebene Art, die hier in Betracht kommen kann, *B. pallipes* (Fig. 2, Taf. I; Fig. 4, Taf. II), hätte ich unbedenklich als eine selbständige Species aufgefasst, wenn ich nicht an den Küsten Schwedens eine Form gefunden hätte, die ohne Zweifel als eine Zwischenform zwischen *B. pallipes* und *B. arctica* anzusehen ist. Dieser Fund gewinnt noch mehr Interesse dadurch, dass die durch diese drei Formen gebildete Serie meines Erachtens unzweideutig auf eine bestimmte Form[1]) als erstes Glied der Serie und Stammform derselben hindeutet. Diese Art ist *B.*

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[1]) Oder eine dieser sehr nahe stehende Form.

capillata KRAMER. Aber ehe ich auf diese Hypothese eingehe, ist es notwendig, die betreffenden Formen zu beschreiben.

Bdella capillata KRAMER.

B. capillata ist zuerst von P. KRAMER 1881 [1]) beschrieben. Später hat BERLESE unter demselben Namen eine Milbe beschrieben und abgebildet, welche sich von der KRAMER'schen Form, wenn auch nicht bedeutend, so doch so sehr unterscheidet [2]), dass sie als eine besondere Varietät zu betrachten ist. Diese Varietät, für welche ich den Namen *Berlesei* vorschlage, unterscheidet sich von der Hauptform durch folgende Merkmale:

Während das zweite Tasterglied bei der Hauptform 6—7 ganz kurze, weit von einander gestellte Borsten trägt, besitzt dasselbe bei der Varietät nach der Beschreibung keine Borste (die Abbildung zeigt dagegen eine). Am fünften Gliede, dessen zwei Endborsten etwa die halbe Länge des Endgliedes erreichen, sind ausser diesen nur sechs kurze Borsten bei der Hauptform vorhanden, während bei der Varietät die Endborsten die ganze Länge des Endgliedes, das ausserdem elf Borsten trägt, erreichen.

Sowohl bei der Hauptform als bei der Varietät sind das zweite und das fünfte Glied von derselben oder annähernd derselben Länge. [3]) Das Längenverhältnis des dritten und vierten Gliedes ist wie 4 : 7 bei der Hauptform; bei der Varietät sind sie dagegen von derselben Länge. Die Mandibeln tragen bei der Hauptform ungefähr elf Borsten, bei der Varietät aber nur neun.

B. capillata var. *pallipes* (L. KOCH).[4] (Fig. 2. Taf. I. Fig. 4. Taf. II).

B. capillata sehr nahe steht *B. pallipes*, welche ich als eine Varietät dieser Art auffasse. Sie unterscheidet sich durch das Hinzukommen einer Borste, welche die Mitte zwischen den beiden Endborsten, von denen die dorsale ein wenig länger ist (bei *B. capillata* von gleicher Länge), und den übrigen Borsten des fünften Gliedes hält und auf der dorsalen Seite nahe dem Vorderende eingefügt ist. Im übrigen ist sie durch mehrere kurze Borsten auf diesem Gliede und durch den Besitz von 4—5 Borsten am zweiten Gliede (also nicht so viele wie bei *B. capillata*) gekennzeichnet. Die Längenverhältnisse stimmen mit denjenigen bei *B. capillata* annähernd überein. Das fünfte Glied ist jedoch ein wenig länger als das zweite (siehe die Tabelle).

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[1]) Zeitschr. f. d. gesammt. Naturwiss. 3 Folge. Bd. VI; p. 446; fig. 12; Taf. III.

[2]) Dass diese Arten nicht identisch sind, hebt KRAMER, wie ich nachher gesehen habe, selbst hervor in Zool. Anzeiger.

[3]) Bei der Hauptform nach KRAMER wie 30 : 29.

[4]) l. c. p. c.

	Borsten der Taster.			
	2	3	4	5
1	5	1	4	11
2	4	1	4	10
3	4	1	4	10

	Länge der Tasterglieder.		
	1	2	3
2	0·204	0·252	0·256
3	0·04	0·044	0·04
4	0·04	0·050	0·056
5	0·224	0·268	0·284

B. capillata Kramer, var. *pallipediformis*, nov. var. (Fig. 4, Taf. I; Fig. 8, Taf. II).

Diese Form wurde auf einer sehr kleinen Felseninsel, wo *B. littoralis* am Ufer sehr allgemein vorkam, gefunden; sie wurde nicht am Ufer, sondern unter Steinen auf der höheren, centralen Partie der Insel angetroffen und war leicht durch ihre gelblichgrüne Farbe von *B. littoralis* zu unterscheiden. Sie stellt, wie oben erwähnt, eine Zwischenstufe zwischen der anderen Varietät und *B. littoralis* dar, und es ist eigentlich nur eine Geschmacksache, zu welcher der beiden Arten — *B. capillata* oder *B. littoralis* — man sie führen will. Was mich veranlasst, sie als eine Varietät von *B. capillata* aufzuführen, ist das Vorhandensein von zweier langen Endborsten am fünften Gliede und die Placierung der Mandibularborsten, welche nicht hauptsächlich am Grunde des Mandibels eingefügt sind, wie bei *B. littoralis*, sondern ziemlich gleichmässig über die ganze Fläche verteilt, wie bei *B. capillata*.

Die Merkmale, welche sie von der Varietät *pallipes* unterscheiden und zu *B. littoralis* nähern, sind folgende:

Am zweiten Gliede sind die Borsten in der Weise placiert, dass zwei am vorderen Ende genau rückenständig sind, wie bei *B. littoralis.* Bei *B. capillata*[1]) und var. *pallipes* ist nur eine Borste rückenständig. Diese Merkmale finden sich, bei der übrigen verhältnismässig grossen Variation in der Anzahl und Placierung der Borsten, immer konstant.

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[1]) Siehe Fig. 2, Taf. 55, bei Berlese. A. M. S. Italiæ, ordo Prostigmata.

Am dritten Gliede ist, wie bei den anderen Formen, nur eine rückenständige Borste vorhanden.

Am vierten Gliede ist von den vier Borsten die innere ventrale die kräftigste (was übrigens auch bei var. *pallipes* vorkommt) wie bei *B. littoralis.*

Das fünfte Glied weist im Vergleich mit *var. pallipes* eine Vermehrung der darauf befindlichen Borsten auf, indem es 14—15 besitzt, welche wie bei *B. littoralis* ziemlich gleichförmig über die ganze Oberfläche des Gliedes verteilt sind, während sie sich bei var. *pallipes* vorwiegend auf der Unterseite placiert finden. Die zwei Endborsten scheinen an Länge ein wenig reduziert worden zu sein. Jedoch war das Material der beiden Varietäten zu gering, als dass ich dies mit Sicherheit entscheiden könnte. Hinsichtlich der Längenverhältnisse der Glieder ist zu bemerken, dass, während das zweite und fünfte Glied von gleicher Länge sind, das vierte dagegen fast doppelt so lang wie das dritte ist. Bei der Varietät *pallipes* sind sie, wie oben erwähnt, von annähernd gleicher Länge; bei *B. littoralis* dagegen erreicht das vierte Glied mehr als die doppelte Länge des dritten.

Die Mandibeln besitzen 16 Borsten, also mehr als bei *B. littoralis*, deren Mandibeln höchstens 14 besitzen.

Das letzte Glied der Serie *capillata—pallipes—pallipediformis* ist *B. littoralis*, deren Beschreibung ich nicht zu wiederholen brauche.

Nach der obigen Darstellung zu urteilen hat *B. littoralis* sich aus *B. capillata*[1]) entwickelt, und in den beiden als Varietäten von letzterer aufgefassten Formen haben wir noch zwei Stufen der Entwicklung vorhanden. Der Verlauf der Entwicklung würde kurz der folgende gewesen sein.

Die beiden langen Endborsten am fünften Gliede bei *B. capillata* sind allmählig reduziert worden, während die übrigen Borsten des fraglichen Gliedes sich an Zahl und Länge vermehrt haben, so dass bei *B. littoralis* kein Unterschied zwischen den Endborsten und den übrigen mehr existiert. Das zweite Glied hat mehrere Borsten bekommen, von denen jetzt zwei rückenständig sind. Das vierte Glied ist doppelt so lang wie das dritte geworden und hat auf der inneren

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[1]) Oder aus einer dieser nahestehenden Form.

(und) unteren Seite eine längere Borste bekommen. Die Mandibeln haben mehrere Borsten bekommen.

Zu dieser Entwicklung kommt nun auch die Grössenzunahme. *B. capillata* hat nach BERLESE eine Länge von ungefähr 1,6 mm. var. *pallipes* und var. *pallipediformis* erreichen eine Länge von 1,8—2,0 mm., während *B. littoralis* eine Länge von 3,0 mm. aufweisen kann.

Die Hypothese gewinnt an Wahrscheinlichkeit dadurch, dass *B. capillata*[1]) die einzige *Bdella*-Art ist, welche mehrere Borsten auf den Mandibeln besitzt und somit hier in Betracht gezogen werden kann. Und es liegt ja auf der Hand, dass eine *Bdella*-Art mit litoraler Lebensweise von einer Art, welche nicht eine Küstenform ist, abstammt, da die grosse Gattung sonst fast keine litoralen Formen aufweist. Die Herausbildung von *B. littoralis* hängt ohne Zweifel mit der litoralen Lebensweise zusammen, und es ist dann von grossem Interesse, dass die Varietät *pallipediformis*, welche der Hypothese nach eine Zwischenform ist, auch in der Lebensweise eine Zwischenstellung einnimmt, indem sie zwar auf den äusseren Schären vorkommt, sich jedoch dort nicht am Ufer, sondern unter Steinen aufhält.

Der Zusammenhang zwischen den bei *B. littoralis* im Vergleich mit *B. capillata* neu erworbenen Eigenschaften — vor allem der Reduzierung der beiden langen Endborsten und der kräftigeren Behaarung des letzten Gliedes der Taster — und der veränderten Lebensweise liegt aller Wahrscheinlichkeit nach darin, dass eine Form, welche an den Küsten und auf den äussersten kleinen Schären lebt, und sich nicht wie die anderen *Bdella*-Arten unter Steinen oder in Moos versteckt, sondern überall sowohl dicht an der Wasserlinie, wie auf der Wasseroberfläche selbst frei herumläuft, in viel höherem Grade der Gefahr ausgesetzt ist, von Wind und Wellen weggeweht und weggespült zu werden, und daher nicht nur kräftige Klauen, sondern auch Taster, welche reichlicher behaart sind und somit viele Unterstützungspunkte darbieten, braucht. Auch beim Gehen auf der Wasseroberfläche muss es von grossem Nutzen sein, reichlich behaarte Taster zu haben, welche natürlich das Wasser abhalten.

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[1]) Mit Ausnahme von *B. hirta* KRAMER, die in Deutsch Ostafrika gefunden ist.

Wenn wir zuletzt die ontogenetische Entwicklung von *B. littoralis* berücksichtigen, finden wir, das auch sie für die Richtigkeit meiner Hypothese spricht.

Bei der Larve[1]) sind nämlich zwei längere Endborsten am fünften Gliede vorhanden, und das dritte und vierte Glied sind von derselben Länge.

Bei den Nymphen wird der Längenunterschied zwischen den Endborsten und den übrigen Borsten immer weniger ausgesprochen, und das vierte Glied nimmt an Grösse zu.

Diese Entwicklung ist somit ganz dieselbe wie diejenige, welche die Serie *B. capillata* KRAMER—*B. capillata* var. *pallipes* (L. KOCH)—*B. capillata* var. *pallipediformis* mihi—*B. littoralis* (L.) darstellt.

Die Mandibeln der Larve besitzen nur zwei Borsten (die der Nymphen neun), während sie bei *B. capillata* 9—11 besitzen. Dies spricht aber nicht gegen die Hypothese, denn ohne Zweifel hat auch die Larve von *B. capillata* nur zwei Borsten auf den Mandibeln; es beweist nur, dass beide von einer Art, die nur zwei Borsten auf den Mandibeln hatte, abstammen.

II. **Bdella**-Arten mit zwei Borsten auf den Mandibeln.

Zu dieser Abteilung gehören, wie oben erwähnt, *B. decipiens* THOR.[2] aus Spitzbergen, *B. borealis* KRAMER & NEUMAN[3] aus der Bering-Insel und *B. vulgaris* (HERM) var. *littoralis* MONIEZ von den Küsten Frankreichs.

Von diesen sind mit Sicherheit *B. decipiens* THOR. und *B. borealis* K. & N. mit einander identisch.

Die zwei von mir untersuchten Exemplare der ersteren Art zeigen folgende Merkmale:

Am zweiten Gliede der Taster (Fig. 1, Taf. II) sind 10—14 Borsten vorhanden, am dritten eine, am vierten vier und am fünften Gliede sechs, von denen die zwei Endborsten sehr lang sind. Die Längenverhältnisse der Glieder sind $37{,}5 : 5 : 4{,}5 : 13{,}5$. Die Längen der Endborsten verhalten sich wie $46 : 37{,}5$.

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[1]) Siehe Fig. 4, Taf. I, in I. TRÄGÅRDH, Die Acariden der Bären-Insel. K. V. A. Bihang. Bd 26. Afd. IV. N:o 7.

[2]) l. c. p. c.

[3]) l. c. p. c.

[4]) l. c. p. c.

Bei *B. borealis* finden sich am zweiten Gliede dem Texte nach 18–20 Borsten, die Figur zeigt dagegen nur elf, am dritten eine, am vierten sind freilich auf der Figur nur zwei vorhanden, die zwei anderen sitzen aber an der Unterseite und sind deswegen ziemlich schwer zu sehen, am fünften Gliede sind nach der Beschreibung sechs vorhanden (die Figur zeigt acht).

Die Längen der vier letzten Glieder verhalten sich wie 34 : 5 : 4 : 14; die verhältnismässige Länge der zwei Endborsten wird durch 45 und 35 ausgedrückt. Wie aus Obigem hervorgeht, ist der Unterschied so äusserst gering, dass es unmöglich ist, die »Arten» als zwei verschiedene aufrecht zu halten.

Bleibt so *B. vulgaris* var. *littoralis* Moniez übrig, und wenn man die grosse Verbreitung der anderen *Bdella*-Art, *B. littoralis* (L.), ins Auge fasst, ist es a priori sehr wahrscheinlich, dass diese mit *B. decipiens* identisch ist. Da aber Moniez in seiner Beschreibung nur die Beziehung der Varietät zur Hauptform erörtert und nur wenige positive Merkmale angiebt und da mir ferner keine Exemplare der Hauptform zur Verfügung standen, halte ich es für angemessener, kein bestimmtes Urteil auszusprechen. Der Unterschied zwischen der Hauptform und der Varietät besteht hauptsächlich in der bedeutenderen Grösse der letzteren, welche eine Länge von 2 mm. erreichen kann. Diese Grössenzunahme der litoralen Form dem nicht litoralen gegenüber ist übrigens dem Verhältnisse bei *B. littoralis*, ganz analog, welche auch die nächstverwandten Arten weit an Grösse übertrifft, und scheint darauf zu deuten, dass die Lebensverhältnisse an den Küsten für die *Bdella*-Arten sehr günstig sind. Wie wir oben gesehen haben, leben sie von Collembolen, Mücken und kleinen Fliegen und diese finden sich immer sehr reichlich an den Küsten. Die Bdelliden haben also Nahrung in Fülle, aber ausserdem kommt noch der Umstand hinzu, dass sie an den Küsten vor einer Menge von Insekten, welche sich nicht einer litoralen Lebensweise haben anpassen können, geschützt sind.

Der Unterschied zwischen *B. decipiens* und *B. arenaria* (= *vulgaris*) ist so gering, dass es sehr möglich ist, dass erstere nur eine Varietät der letzteren ist. Vorläufig, ehe ich *B. vulgaris* untersucht habe, halte ich jedoch *B. decipiens* aufrecht. Die grosse Übereinstimmung geht aus folgender Tabelle hervor: Die Angaben über *B. vulgaris* sind KRAMERS Beschreibung entnommen.

	Längenverhältnisse:	
	der Tasterglieder.	der Endborsten.
B. decipiens	37,5 : 5 : 4,5 : 13,5	46 : 37,5
(*B. borealis*)	34 : 5 : 4 : 14	45 : 35
B. vulgaris (=*arenaria*)	35 : 6 : 6 : 20	55 : 48

Aus dieser Tabelle ist auch ersichtlich, dass bei *B. decipiens* der *B. vulgaris* gegenüber eine Reduzierung des letzten Tastergliedes und der beiden Endborsten eingetreten ist.

Das Resultat der Revision ist somit, dass alle die in der Litteratur beschriebenen litoralen **Bdella**-*Arten sich wahrscheinlich auf nur zwei Arten zurückführen lassen, nämlich* **B. littoralis** (L.) *und* **B. decipiens** THORELL. **Bdella littoralis** (L.) *stammt von* **B. capillata** KRAMER *oder einer dieser sehr nahestehenden Art ab, und* **B. capillata** *var.* **pallipes** *und* **B. capillata** *var.* **pallipediformis** *sind als Zwischenstufen in dieser Entwicklung anzusehen. Die postembryonale Entwicklung von* **B. littoralis** *bestätigt diese Annahme und zeigt auch, dass diejenigen* **Bdella**-*Arten, welche mehrere Borsten auf den Mandibeln besitzen, von* **Bdella**-*Arten mit zwei Borsten auf den Mandibeln abstammen.*

B. decipiens *ist wahrscheinlich als eine Varietät von* **B. vulgaris** *anzusehen.*

Die geographische Verbreitung der litoralen *Bdella*-Arten ist eine sehr weite.

Bdella littoralis (L.) kommt überall an den Küsten der arktischen und subarktischen Gebiete vor. *B. vulgaris* var. *littoralis* MONIEZ ist von den Küsten Frankreichs bekannt. *B. decipiens* ist bis jetzt an den Küsten von Schweden und Sibirien und auf Spitzbergen gefunden.

Dagegen ist es wahrscheinlich, dass *Bdella*-Arten nicht an den Ufern des Mittelmeeres vorkommen. Wenigstens kann man ihre Abwesenheit an den Küsten Italiens als konstatiert betrachten. Die Acaridenfauna von diesem Lande ist nämlich gegenwärtig die am besten bekannte u. a. durch die grosse Arbeit von A. Berlese, »Acari Myriopoda et Scorpiones hucusque in Italia reperta», und in dieser erwähnt Berlese keine litorale *Bdella*-Art. Dass er aber auch die litorale Acaridenfauna untersucht hat, das zeigt der Fund von einer anderen litoralen Trombidiide *Halotydeus hydrodromus* Berl. Man dürfte daraus schliessen können, dass keine *Bdella*-Arten an Italiens Küsten vorkommen, und es ist dann sehr interessant zu finden, dass eine andere *Trombidiiden*-Gattung eine litorale Art ausgebildet hat, die für *Bdella* vikariiert.

Erklärung der Tafeln.

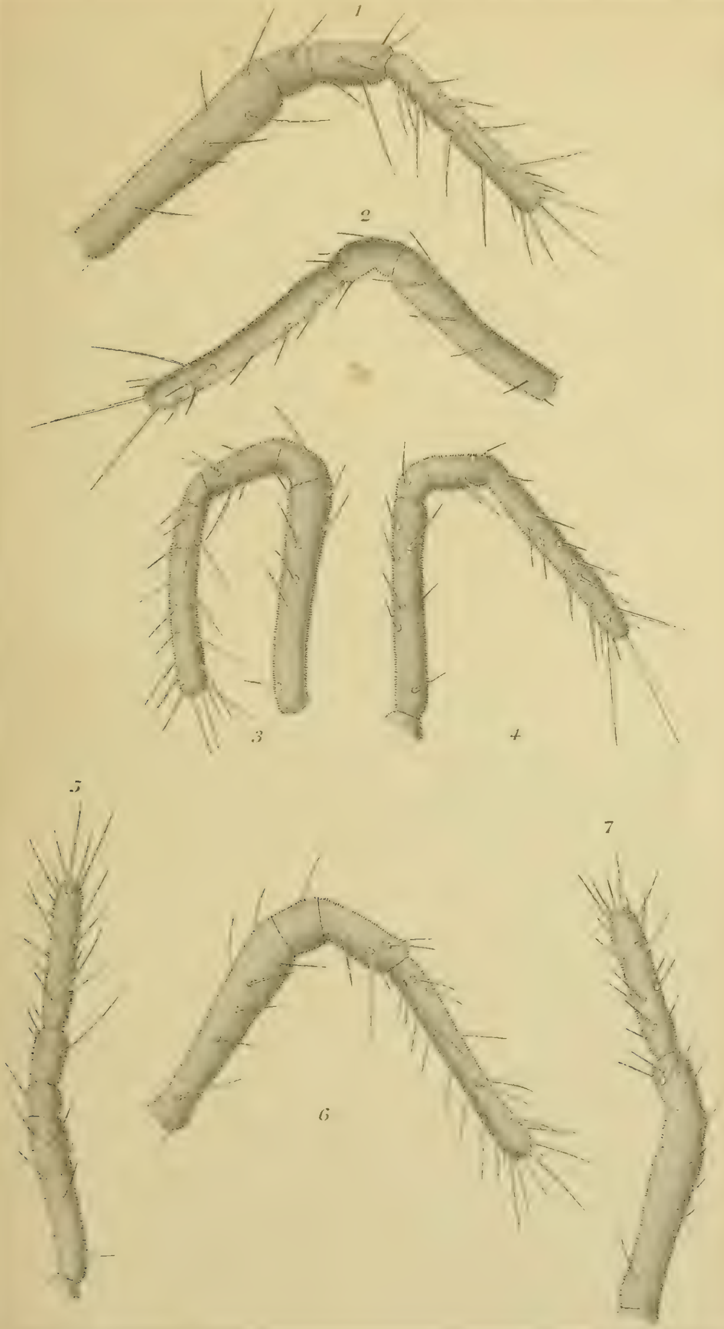
Taf. I.

Fig. 1. Taster von *Bdella littoralis* (L.) von der Westküste von Schweden. 75×1. Länge 3 mm.
» 2. » » » *capillata* Kramer var. *pallipes* (L. Koch). Typenexemplar. 107×1.
» 3. » » » *arctica* Thorell. Typenexemplar. 75×1.
» 4. » » » *capillata* Kramer var. *pallipediformis* nov. var. 75×1.
» 5. » » » *grandis* L. Koch. Typenexemplar. 75×1.
» 6. » » » *sanguinea* Trouessart. Typenexemplar. 75×1.
» 7. » » » *littoralis* (L.) von der Ostküste von Schweden. 75×1. Länge 2 mm.

Taf. II.

Fig. 1. Taster von *Bdella decipiens* Thorell.
» 2. Mandibeln von *Bdella arctica* Thorell.
» 3. » » » *decipiens* Thorell.
» 4. » » » *capillata* Kramer var. *pallipes* (L. Koch). Typenexemplar.
» 5. » » » *littoralis* (L.). Nymphe. 9 Haare.
» 6. » » » *arctica* Thorell L. Koch det.
» 7. » » » *littoralis* (L.). 13 Haare.
» 8. » » » *capillata* Kramer var. *pallipediformis*.
» 9—10. » » » *littoralis* (L.). 14 und 12 Haare.

Tryckt den 13 mars 1902.



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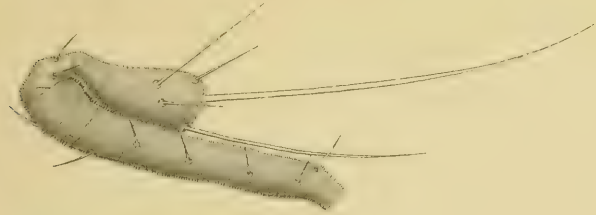

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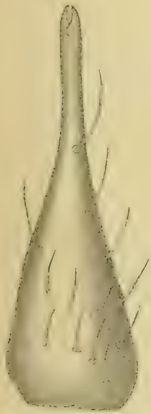

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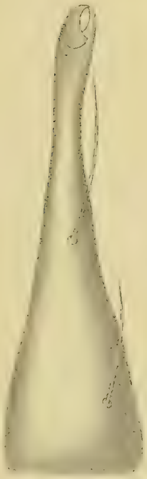

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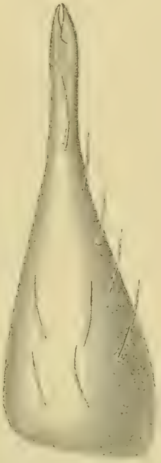

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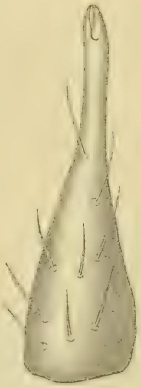

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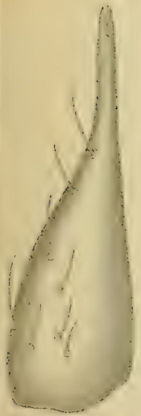

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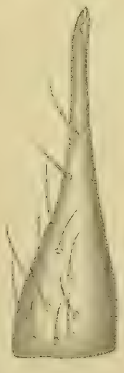

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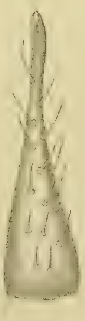

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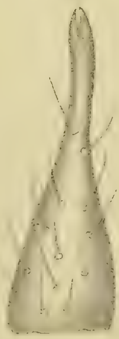

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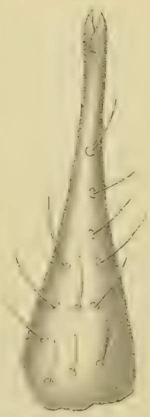

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